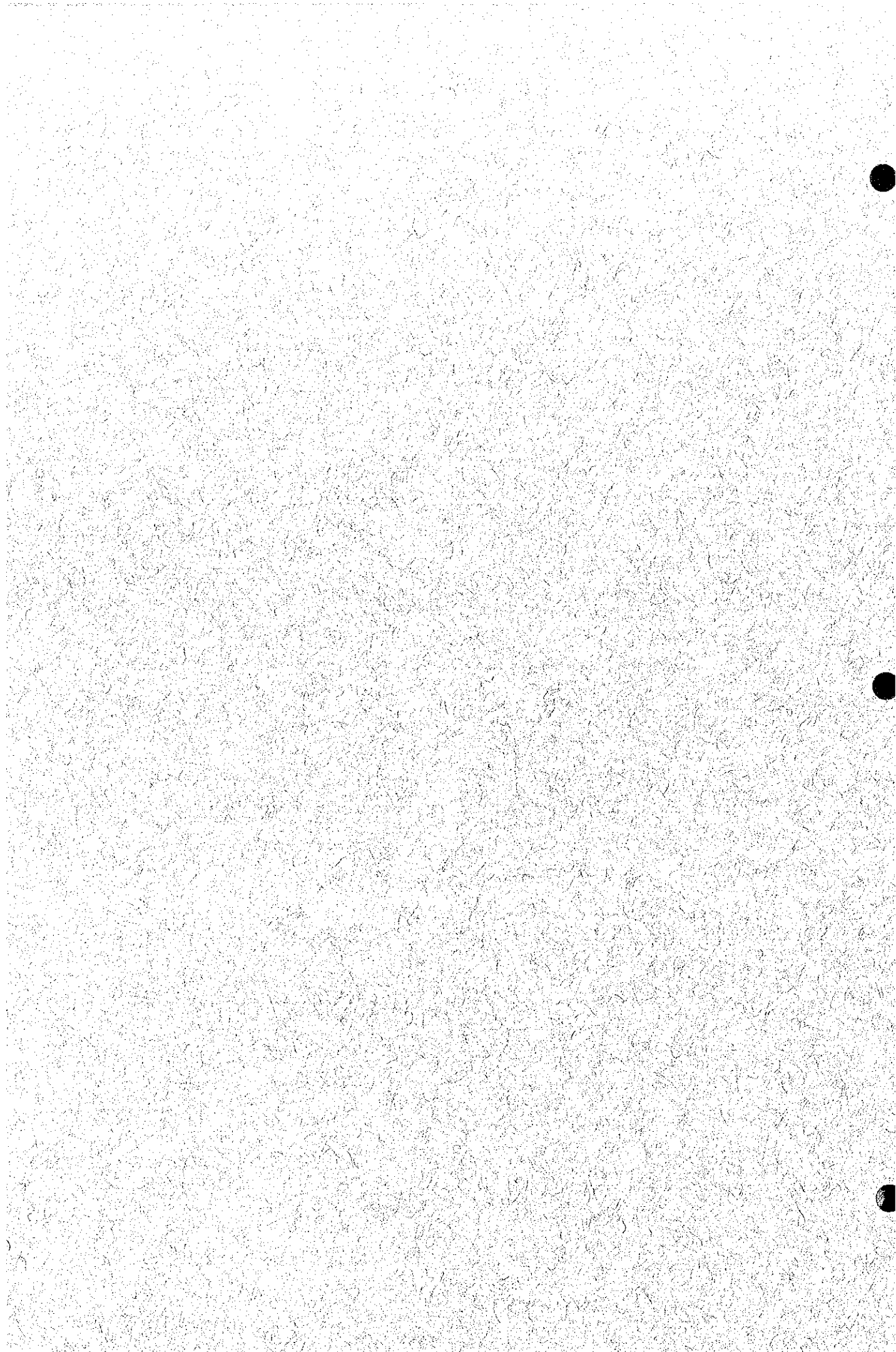


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**FUTURE REQUIREMENTS  
AND DEVELOPMENT PLAN**

**B**



## 8. FUTURE REQUIREMENTS IN WATER SUPPLY AND SANITATION IMPROVEMENT

### 8.2 Targets of Provincial Sector Plan

Table 8.2.1 Estimation of Base Year Service Coverage of Water Supply

Name of Municipality	Area	Population (1998)	Population Served by 1998 Facilities				Population Served by Planned/On-going Projects				Population Served in the Base Year (1998)				
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Percentage Coverage
Asuncion	Urban	7,325	1,200		834	2,034							834	2,034	28
	Rural	50,556	552	1,200	13,715	15,467							1,200	13,715	31
	Total	57,881	1,752	1,200	14,549	17,501							1,752	14,549	30
Braulio E. Dujali	Urban	15,577			691	691							691	691	4
	Rural	15,577			691	691							691	691	4
	Total	31,154			1,382	1,382							1,382	1,382	4
Carmen	Urban	45,937	1,446		592	2,152							592	2,152	5
	Rural	54,653	3,006		592	3,598							592	3,598	7
	Total	100,590	4,452		1,184	5,750							1,184	5,750	6
Island Garden City of Samal	Urban	16,733	3,990	756	1,827	6,573							756	1,827	39
	Rural	65,126	420	14,027	1,724	16,171							1,724	16,171	25
	Total	81,859	4,410	14,783	3,551	22,744							3,551	22,744	28
Kapalong	Urban	10,224	2,778	4,780	7,558								4,780	7,558	74
	Rural	53,930	1,038	360	31,785	33,183							360	31,785	62
	Total	64,154	3,816	360	36,565	40,741							360	36,565	64
New Corella	Urban	8,389	2,256		2,256								2,256	2,256	27
	Rural	36,514	1,188	2,880	12,484	16,552							2,880	12,484	45
	Total	44,903	3,444	2,880	12,484	18,808							2,880	12,484	42
Panabo	Urban	47,762	4,590	14,166	18,756								14,166	18,756	39
	Rural	85,598	2,388	1,380	32,533	36,301							1,380	32,533	42
	Total	133,360	6,978	1,380	46,699	55,057							1,380	46,699	41
Santo Tomas	Urban	29,421	15,033	5,769	20,802								5,769	20,802	71
	Rural	53,201	780	3,000	31,677	35,457							3,000	31,677	67
	Total	82,622	15,813	3,000	37,446	56,259							3,000	37,446	68
Tagum City (Capital)	Urban	91,030	43,590	26,802	70,392								26,802	70,392	77
	Rural	78,334	47,844	5,473	53,317								5,473	53,317	68
	Total	169,364	91,434	32,275	123,709								32,275	123,709	73
Talaingod	Urban	17,141		660	13,053	13,713							660	13,053	80
	Rural	17,141		660	13,053	13,713							660	13,053	80
	Total	34,282		1,320	26,106	27,426							1,320	26,106	80
Provincial Total	Urban	219,600	74,883	756	54,178	129,817							756	54,178	59
	Rural	501,914	55,770	23,507	143,727	223,004							23,507	143,727	44
	Total	721,514	130,653	24,263	197,905	352,821							24,263	197,905	49

Table 8.2.2 Population Coverage in Phase I Provided by Served Population in the Base Year (Water Supply)

Name of Municipality	Area	Population Served by 1998 Facilities					1998		2003	
		Level III	Level II	Level I	Total	Total Population	Coverage (%)	Total Population	Coverage (%)	
Asuncion	Urban	1,200		834	2,034	7,325	28	7,481	27	
	Rural	552	1,200	13,715	15,467	50,556	31	51,626	30	
	Total	1,752	1,200	14,549	17,501	57,881	30	59,107	30	
Braulio E. Dujali	Urban									
	Rural			691	691	15,577	4	17,887	4	
	Total			691	691	15,577	4	17,887	4	
Carmen	Urban	1,446			1,446	8,716	17	9,739	15	
	Rural	1,560		592	2,152	45,937	5	51,332	4	
	Total	3,006		592	3,598	54,653	7	61,071	6	
Island Garden City of Samal	Urban	3,990	756	1,827	6,573	16,733	39	18,560	35	
	Rural	420	14,027	1,724	16,171	65,126	25	71,930	22	
	Total	4,410	14,783	3,551	22,744	81,859	28	90,490	25	
Kapalong	Urban	2,778		4,780	7,558	10,224	74	10,743	70	
	Rural	1,038	360	31,785	33,183	53,930	62	56,670	59	
	Total	3,816	360	36,565	40,741	64,154	64	67,413	60	
New Corella	Urban	2,256			2,256	8,389	27	9,499	24	
	Rural	1,188	2,880	12,484	16,552	36,514	45	41,346	40	
	Total	3,444	2,880	12,484	18,808	44,903	42	50,845	37	
Panabo	Urban	4,590		14,166	18,756	47,762	39	55,665	34	
	Rural	2,388	1,380	32,533	36,301	85,598	42	99,764	36	
	Total	6,978	1,380	46,699	55,057	133,360	41	155,429	35	
Santo Tomas	Urban	15,033		5,769	20,802	29,421	71	32,877	63	
	Rural	780	3,000	31,677	35,457	53,201	67	59,450	60	
	Total	15,813	3,000	37,446	56,259	82,622	68	92,327	61	
Tagum City (Capital)	Urban	43,590		26,802	70,392	91,030	77	103,486	68	
	Rural	47,844		5,473	53,317	78,334	68	89,053	60	
	Total	91,434		32,275	123,709	169,364	73	192,539	64	
Talaingod	Urban									
	Rural		660	13,053	13,713	17,141	80	27,629	50	
	Total		660	13,053	13,713	17,141	80	27,629	50	
Provincial Total	Urban	74,883	756	54,178	129,817	219,600	59	248,050	52	
	Rural	55,770	23,507	143,727	223,004	501,914	44	566,687	39	
	Total	130,653	24,263	197,905	352,821	721,514	49	814,737	43	

Table 8.2.3 Number of Households Served by Sanitary Toilets in the Base Year (1998)

Name of Municipality	Area	Population (1998)	Number of Households (1998)	Households Using Sanitary Toilets in 1998				Recipient HHs of Planned/On-going Projects				Households Using Sanitary Toilets in the Base Year (1998)									
				Flush Toilets	Four Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Coverage (%)					
																Pour Flush	Total				
Asuncion	Urban	7,325	1,420	3	1,206	90	1,299														
	Rural	50,556	9,741		7,145	245	7,390														
	Total	57,881	11,161	3	8,351	335	8,689														
Braulio E. Dujali	Urban																				
	Rural	15,577	3,300		2,039	112	2,151														
	Total	15,577	3,300		2,039	112	2,151														
Carmen	Urban	8,716	1,692	53	768	169	990														
	Rural	45,937	9,061		4,462	1,754	6,216														
	Total	54,653	10,753	53	5,230	1,923	7,206														
Island Garden City of Samar	Urban	16,733	3,300	7	2,076	173	2,256														
	Rural	65,126	12,695	40	4,727	3,339	8,106														
	Total	81,859	15,995	47	6,803	3,512	10,362														
Kapalong	Urban	10,224	1,978	128	1,601	73	1,802														
	Rural	53,930	10,939		1,989	5,453	7,442														
	Total	64,154	12,917	128	3,590	5,526	9,244														
New Corella	Urban	8,389	1,574		1,165	59	1,224														
	Rural	36,514	6,812		2,716	1,740	4,456														
	Total	44,903	8,386		3,881	1,799	5,680														
Panabo	Urban	47,762	9,439	956	5,678	377	7,011														
	Rural	85,598	16,557		7,864	3,956	11,820														
	Total	133,360	25,996	956	13,542	4,333	18,831														
Santo Tomas	Urban	29,421	5,615	175	3,768	397	4,340														
	Rural	53,201	10,411		3,824	3,128	6,952														
	Total	82,622	16,026	175	7,592	3,525	11,292														
Tagum City (Capital)	Urban	91,030	17,439	5,236	10,593	627	16,456														
	Rural	78,334	15,360		7,534	4,255	11,789														
	Total	169,364	32,799	5,236	18,127	4,882	28,245														
Talaingod	Urban	17,141	3,578		468	986	1,454														
	Rural	17,141	3,578		468	986	1,454														
	Total	34,282	7,156		936	1,972	2,908														
Provincial Total	Urban	219,600	42,457	6,558	26,855	1,965	35,378														
	Rural	501,914	98,454	40	42,768	24,968	67,776														
	Total	721,514	140,911	6,598	69,623	26,933	103,154														

Table 8.2.4 Number of Public School Student Served by School Toilets in Base Year (1998)

Name of Municipality	1998 Total Number of Public School Student	Standard No. of Student that can be Served by 1998	No. of Student to be Served by Planned /On-going Projects	Standard No. of Students that can be Served by Toilets in Base Year (1998)	Coverage (%)
Asuncion	14,682	9,320		9,320	63
Braulio E. Dujali	4,986	2,480		2,480	50
Carmen	11,313	6,640		6,640	59
Island Garden City of Samal	18,841	7,360		7,360	39
Kapalong	15,447	6,720		6,720	44
New Corella	10,055	4,080		4,080	41
Panabo	29,510	9,200		9,200	31
Santo Tomas	18,835	4,920		4,920	26
Tagum City (Capital)	37,874	14,840		14,840	39
Talaingod	1,757	680		680	39
<b>Provincial Total</b>	<b>163,300</b>	<b>66,240</b>		<b>66,240</b>	<b>41</b>

Table 8.2.5 Number of Public Utilities with Sanitary Toilets in the Base Year (1998)

Name of Municipality	Type	No. of PU with Toilets in 1998	No. of PU with Sanitary Toilets in 1998	No. of PU with Toilets Planned/On-going Project	No. of PU with Sanitary Toilets Planned/On-going Projects	No. of PU with Sanitary Toilets in Base Year 1998	No. of PU with Sanitary Toilets in Base year 1998	Coverage (%)
Asuncion	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	1	1			1	1	100
	Parks/Playground	2	2			2	2	100
	Total	4	4			4	4	100
Braulio E. Dujali	Public Market							
	Bus/Jeepney Terminal							
	Parks/Playground							
	Total							
Carmen	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	1	1			1	1	100
	Parks/Playground	1	1			1	1	100
	Total	3	3			3	3	100
Island Garden City of Samar	Public Market	4	4			4	4	100
	Bus/Jeepney Terminal	2	2			2	2	100
	Parks/Playground	5	5			5	5	100
	Total	11	11			11	11	100
Kapalong	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	1	1			1	1	100
	Parks/Playground	2	2			2	2	100
	Total	4	4			4	4	100
New Corella	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	1	1			1	1	100
	Parks/Playground	1	1			1	1	100
	Total	3	3			3	3	100
Panabo	Public Market	2	2			2	2	100
	Bus/Jeepney Terminal	1	1			1	1	100
	Parks/Playground	1	1			1	1	100
	Total	4	4			4	4	100
Santo Tomas	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	1	1			1	1	100
	Parks/Playground	2	2			2	2	100
	Total	4	4			4	4	100
Tagum City (Capital)	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	2	2			2	2	100
	Parks/Playground	2	2			2	2	100
	Total	5	5			5	5	100
Talaingod	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal							
	Parks/Playground							
	Total	1	1			1	1	100
Provincial Total	Public Market	14	14			14	14	100
	Bus/Jeepney Terminal	8	8			8	8	100
	Parks/Playground	13	13			13	13	100
	Total	35	35			35	35	100

Table 8.2.6 Households Coverage in Phase I Provided by Existing Facilities in the Base Year (Household Toilets)

Name of Municipality	Area	No. of Household Served by Existing Facilities					Coverage in 1997					Coverage in 2003						
		Flush	Pour Flush	VIP/Dry	Total	No. of HHs	Percentage of Served Households			No. of HHs	Percentage of Served Households							
							Flush	VIP/Drv	Total		Flush	VIP/Drv	Total					
Asuncion	Urban	3	1,206	90	1,299	1,420	85	6	91	6,666	91	1,450	83	6	90	9,410	90	
	Rural		7,145	245	7,390	9,741	73	3	76	5,567	76	9,947	72	2	74	38,395	74	
	Total	3	8,351	335	8,689	11,161		75	3	78	12,233	78	11,397	73	3	76	47,805	76
Braulio E. Dujali	Urban		2,039	112	2,151	3,300	62	3	65		65	3,790	54	3	57	12,095	57	
	Rural		2,039	112	2,151	3,300	62	3	65		65	3,790	54	3	57	12,095	57	
	Total	53	768	169	937	990	3	45	10	59	5,142	59	1,891	3	41	9	52	7,174
Carmen	Urban		4,462	1,754	6,216	9,061	49	19	69	6,014	69	10,125	44	17	61	36,556	61	
	Rural		5,230	1,923	7,206	10,753	49	18	67	11,156	67	12,016	44	16	60	43,730	60	
	Total	7	2,076	173	2,256	3,300	63	5	68	11,378	68	3,661	57	5	62	16,018	62	
Island Garden City of Samar	Urban		4,727	3,339	8,106	12,695	37	26	64	10,709	64	14,021	34	24	58	41,243	58	
	Rural		6,803	3,512	10,362	15,995	43	22	65	22,087	65	17,682	38	20	59	57,261	59	
	Total	128	1,601	73	1,802	1,978	6	4	91	9,304	91	2,078	6	4	87	13,240	87	
Kapalong	Urban		1,989	5,453	7,442	10,939	18	50	68	6,952	68	11,495	17	47	65	43,360	65	
	Rural		3,590	5,526	9,244	12,917	28	43	72	16,256	72	13,573	26	41	68	56,600	68	
	Total		1,165	59	1,224	1,574	74	4	78	6,543	78	1,782	65	3	69	8,920	69	
New Corella	Urban		2,716	1,740	4,456	6,812	40	26	65	5,453	65	7,714	35	23	58	26,430	58	
	Rural		3,881	1,799	5,680	8,386	46	21	68	11,996	68	9,496	41	19	60	35,350	60	
	Total	956	5,678	377	7,011	9,439	10	4	74	35,344	74	11,001	9	52	64	51,482	64	
Panabo	Urban		7,864	3,956	11,820	16,557	47	24	71	33,911	71	19,297	41	21	61	62,355	61	
	Rural		13,542	4,333	18,831	25,996	4	52	72	69,255	72	30,298	3	45	62	113,837	62	
	Total	175	3,768	397	4,340	5,615	3	67	77	22,654	77	6,274	3	60	69	30,054	69	
Santo Tomas	Urban		3,824	3,128	6,952	10,411	37	30	67	19,712	67	11,634	33	27	60	38,098	60	
	Rural		7,592	3,525	11,292	16,026	1	47	70	42,366	70	17,908	1	42	63	68,152	63	
	Total	5,236	10,593	627	16,456	17,439	30	61	94	85,568	94	19,825	26	53	83	122,481	83	
Tagum City (Capital)	Urban		7,534	4,235	11,789	15,360	49	28	77	70,093	77	17,461	43	24	68	54,557	68	
	Rural		18,127	4,882	28,245	37,799	16	55	86	155,661	86	37,286	14	49	76	177,038	76	
	Total		468	986	1,454	3,578	13	28	41		41	5,768	8	17	25	7,346	25	
Talaingod	Urban		26,855	1,965	35,378	42,457	15	63	83	182,599	83	47,962	14	56	74	258,779	74	
	Rural		42,768	24,968	67,776	98,454	43	25	69	158,411	69	111,232	38	22	61	360,435	61	
	Total	6,598	69,623	26,933	103,154	140,911	5	49	73	341,010	73	159,214	4	44	77	619,214	65	
<b>Provincial Total</b>																		



Table 8.2.7 Public School Students and Public Utilities Coverage in Phase I by Existing Facilities in the Base Year

Name of Municipalities	Public School Toilets						Public Toilets					
	Std. No. of Student that can be Served by Base Year	Coverage in 1998		Coverage in 2003		No. of PU with Toilets in Base Year	No. of PU with Sanitary Toilets in Base Year	%	No. of PU with Toilets	No. of PU with Sanitary Toilets in Base Year	%	
		Total No. of Public School Students	%	Total No. of Public School Student	%							
Asuncion	9,320	14,682	63	14,993	62	4	4	100	4	4	100	
Braulio E. Dujali	2,480	4,986	50	5,726	43		6					
Carmen	6,640	11,313	59	12,658	52	3	3	100	3	3	100	
Island Garden City of	7,360	18,841	39	20,827	35	11	11	100	25	11	44	
Kapalong	6,720	15,447	44	16,232	41	2	2	100	3	2	67	
New Corella	4,080	10,055	41	11,385	36	3	3	100	3	3	100	
Panabo	9,200	29,510	31	34,395	27	4	4	100	5	4	80	
Santo Tomas	4,920	18,835	26	21,047	23	2	2	100	3	2	67	
Tagum City (Capital)	14,840	37,874	39	43,055	34	5	5	100	5	5	100	
Talaingod	680	1,757	39	2,832	24	1	1	100	4	1	25	
<b>Provincial Total</b>	<b>66,240</b>	<b>163,300</b>	<b>41</b>	<b>183,150</b>	<b>36</b>	<b>35</b>	<b>61</b>	<b>100</b>	<b>35</b>	<b>61</b>	<b>57</b>	

### 8.3 Projection of Frame Values

#### 8.3.1 Review of Past Population Development and Population Projection

Since the NSO has not yet prepared/issued future population of the provinces, the provincial population for the years 1997 (planning base year), 2003 (medium-term target year) and 2010 (long-term target year) were projected. Available information for the study is as follows:

- NSO population census results in 1980, 1990 and 1995
- 1995 Census-based National and Regional Population Projection prepared by the NSO
- Provincial Physical Framework Plan/Comprehensive Provincial Land Use Plan (1993-2002)

Before the study of the existing data and projections, the background of the province must be organized. The following are the major changes of the previous Davao Province and its component municipalities/cities.

The provinces of 'Davao del Norte' and 'Compostela Valley' were created having separated from the previous 'Davao Province' in 1998. Some municipalities of Davao Province were merged and/or separated to create new municipality/city. Table 8.3.1 shows the changes on merging/separation of the municipalities of the Davao Province from 1980 to 1998.

**Table 8.3.1 Particulars on Merging/Separation of Municipalities of Davao Province**

Municipality/Year	'80	'90	'95	'98
Asuncion*				
Babak*				Merged into newly created Island Garden City of Samal
Braulio E. Dujali*				Newly created from part of Carmen and Panabo
Carmen*				2 brgys were transferred to newly created B. E. Dujali
Compostela				Compostela Valley
Kapalong*				3 brgys were transferred to newly created Talaingod
Kaputian*				Merged into newly created Island Garden City of Samal
Laak				Compostela Valley
Mabini				Compostela Valley
Maco				Compostela Valley
Maragusan				Compostela Valley
Mawab				Compostela Valley
Monkayo				Compostela Valley
Montevista				Compostela Valley
Nabunturan				Compostela Valley
New Bataan				Compostela Valley
New Corella*				
Panabo*				3 brgys were transferred to newly created B. E. Dujali
Pantukan				Compostela Valley
Samal*				Merged into newly created Island Garden City of Samal
Santo Tomas*				
Tagum*				Tagum City (Capital of Davao del Norte)
Talaingod*				Newly created consisting of 3 brgys of Kapalong

Note: \* municipalities of Davao del Norte Province

(1) 1995 Census-Based National and Regional Population Projections: NSO

The NSO conducted the national population projections for the period 1995-2040 and the regional projections for the period 1995-2020. The assumptions take into account future trends in the demographic processes of fertility, mortality and migration required by the cohort-component method for projecting population. The 1995 Population Census was used as the basis for the projection.

In the regional population projection, Region X and XI, the subject regions for the 2<sup>nd</sup> batch areas of this study are classified as medium-sized regions (at least 5 million but less than 10 million by year 2000). The following are the result of projection for the two regions in 2000, 2005 and 2010.

**Table 8.3.2 Regional Population Projection**

Year		1980	1990	1995	2000	2005	2010
Region X	Population	2,758,985	3,509,753	3,938,252	4,441,739	4,955,545	5,465,272
	Growth Rate	-	2.44 %	2.33 %	2.44 %	2.21 %	1.98 %
Region XI	Population	3,346,803	4,458,829	5,052,730	5,749,821	6,456,464	7,146,889
	Growth Rate	-	2.91 %	2.53 %	2.62 %	2.35 %	2.05 %

Note: Growth rate of Region XI from 1990 to 2000 is projected at 2.58 %.

(2) Provincial Physical Framework Plan/Comprehensive Provincial Land Use Plan: Davao Province: Planning period 1993-2002

The provincial population (Davao Province) for the year 2002 was projected with 1990 as the base year. The provincial growth rate of 3.8% experienced between 1980 and 1990 was adopted for the projection. Meanwhile, the recorded/ projected growth rates of Region XI are 2.91% between 1980 and 1990 and 2.58% between 1990 and 2000.

The population projection on the provincial total and component municipalities was made with 1990 as base year. The population for the year 2002 was projected using a uniform growth rate between 1990 and 2002 referring to the experience from 1980 to 1990 (census years).

Table 8.3.3 shows the past population development in census years (1980-1995) and projections for the years 1995 and 2002 with 1990 as base year 1990 using the assumed growth rates for the period 1990 to 2002 as established in the Comprehensive Provincial Land Use Plan (hereafter referred to as "Land Use Plan").

Table 8.3.3 Census Population and Projected Population

Municipality	Census Population /Growth Rate (%)			Projected Population/Adopted Growth Rate (%) : Base Year 1990 in Land Use Plan	
	1980	1990	1995	1995	2002
Asuncion	42,915	54,954	57,072	62,186	73,938
		2.50	0.76	2.50	2.50
Babak	21,368	24,824	28,726	26,756	29,717
		1.51	2.96	1.51	1.51
Carmen	30,719	49,507	56,260	61,695	83,958
		4.89	2.59	4.5	4.5
Compostela	30,538	53,546	55,030	69,651	100,650
		5.78	0.55	5.4	5.4
Kapalong	35,688	58,189	62,183	72,862	99,821
		5.01	1.34	4.6	4.6
Kaputian	22,192	23,923	26,874	24,838	26,179
		0.75	2.35	0.75	0.75
Laak	31,581	35,895	51,073	38,268	41,857
		1.29	7.31	1.29	1.29
Mabini	16,517	24,433	29,548	29,717	39,087
		3.99	3.87	3.99	3.99
Maco	41,017	55,991	58,609	65,418	81,340
		3.16	0.92	3.16	3.16
Maragusan	20,220	40,982	40,834	57,211	91,269
		7.32	-0.07	6.9	6.9
Mawab	20,960	28,072	29,878	32,487	39,860
		2.96	1.25	2.96	2.96
Monkayo	37,571	58,239	66,550	71,198	94,324
		4.48	2.70	4.1	4.1
Montevista	20,626	29,789	31,905	35,799	46,305
		3.74	1.38	3.74	3.74
Nabunturan	37,292	53,410	56,576	63,918	82,192
		3.66	1.16	3.66	3.66
New Bataan	32,887	39,629	43,327	43,502	49,568
		1.88	1.80	1.88	1.88
New Corella	24,926	36,138	41,615	43,513	56,434
		3.78	2.86	3.78	3.78
Panabo	71,098	110,172	130,585	134,687	178,435
		4.48	3.46	4.1	4.1
Pantukan	30,281	46,300	56,780	56,061	73,277
		4.34	4.17	3.9	3.9
Samal	18,863	19,826	21,395	20,326	21,047
		0.50	1.53	0.50	0.50
Sto. Tomas	44,512	67,916	77,182	82,234	107,488
		4.32	2.59	3.9	3.9
Tagum	86,201	135,440	156,588	166,374	221,901
		4.62	2.94	4.2	4.2
Talaingod	7,181	7,841	12,853	8,193	8,714
		0.88	10.39	0.88	0.88
Province	725,153	1,055,016	1,191,443	1,266,895	1,647,359
		3.82	2.46	3.73	3.78

Note: 1980 and 1990 population of Talaingod represent the figures of related barangays before the creation of the municipality.

Comparing the census and the projected population in 1995, the provincial population of the census was lower to about 6% than the projected one. Regarding the municipal census population in 1995, about 70% (16 municipalities) of the 22 municipalities is lower than the projected ones (maximum 20 % difference). While, the remaining municipalities are higher with a range of 0-60 %. Among the municipalities, Compostela, Laak and Talaingod have remarkable differences with about 30-60% between the census and the projected population. In this connection, it is necessary to reflect the 1995 census results in the projection as the base year population.

(3) Population Projection of the Province

The following conditions are considered/assumed in the population projection.

Provincial Population

- 1) The projection of the provincial population for the previous Davao Province was first made. Then, the population of Davao del Norte was projected proportionally, dividing the population of the Davao Province referring to the share of the two re-arranged provinces in 1995. The following are the past population and the shares of the two provinces considering the composition of the municipalities by province. The shares between the two provinces are almost constant in the last 15 years. Therefore, it may be assumed that the shares will be constant throughout the future.

Year	1980	1990	1995
Davao del Norte	405,663 (55.9%)	588,730 (55.8%)	671,333 (56.3%)
Compostela Valley	319,490 (44.1%)	466,286 (44.2%)	520,110 (43.7%)

- 2) The growth rates experienced by the province/municipalities from 1990 to 1995 are basically adopted for the projection of medium-term target years (1997-2003). However, the provincial population was first determined by applying the growth rate from 1990 to 1995 (2.46%) before finalization of the municipal population and their growth rates. The base year for the projection is 1995 using census results.
- 3) For the long-term projection, from 2004 to 2010, the population ratio of the province to the regional total population was assumed considering past experience.

The range of population ratios of the provincial population (Davao Province) to the regional population (from 1980 to 1995 and projected year 2002 in the Land Use Plan) considered the correlation with other component provinces in the region and the

the projected regional population. The following are population ratios of the province to the region both in the past and projected.

<u>Year</u>	<u>1980</u>	<u>1990</u>	<u>1995</u>	<u>2002</u>	<u>2003</u>	<u>2010</u>
Province	725,153	1,055,016	1,191,443	1,647,359	1,447,132	1,672,372
Region	3,346,803	4,458,829	5,052,730	6,032,322	6,173,575	7,146,889
P/R (%)	21.7	23.7	23.6	27.3	23.4	23.4

The population ratios of the province from 1980 to 1990 were about 22-24% and the 1995 census results maintained almost the same ratio as that of 1990. The ratio for the year 2002, which was projected in the Land Use Plan (27.3%) seems to be over-estimated referring to the past experience (1980-1995). The projected population for the year 2003 as mentioned above, is 23.4% of the regional population. The population ratio of the province between 22-24% may be taken into account throughout the future. The provincial ratio of 23.4% (projected for the year 2003) is adopted for the year 2010 to determine the 2010 provincial population (estimated growth rate is 2.09%, while the regional rate from 2000-2005 is assumed at 2.05%). The projected population for the years 1997, 2003 and 2010 are as follows:

<u>Year</u>	<u>Population</u>	<u>Growth rate</u>
1995	1,191,443	Census result
1997	1,250,783	2.46 % (growth rate from 1990 to 1995)
2003	1,447,132	2.46 % (growth rate from 1990 to 1995)
2010	1,672,372	2.09% (estimated from projected population)

The total population of Davao del Norte by target year was distributed to the two created provinces in proportion to the respective population sizes in 1995; Davao del Norte 56.3% and Compostela Valley 43.7%. The following are the population of Davao del Norte by target year.

<u>Year</u>	<u>Population</u>	<u>Growth rate</u>
1995	671,333	Census result (670,782 applying the share 56.3%)
1997	704,191	2.46 %
2003	814,735	2.46 %
2010	941,545	2.09 %

In comparison to the projected population of 959,400 in the year 2010 established by the Davao Integrated Development Program (DIDP-JICA assisted project) and the

result of this study (941,545), the figures are almost the same with only a 2% difference. Therefore, the figures on the provincial population in this study may be employed.

Municipal/city population

- 1) The total population of the province by target year is fixed.
- 2) The projection of municipal/city population for Davao del Norte is made.
- 3) The growth rates of the respective municipalities for the years 1997 and 2003 are determined referring to the development experienced between 1990 and 1995. The municipal population for the respective target years was finally adjusted according to the initially calculated population sizes to meet fixed provincial population. Accordingly, the growth rates of the municipalities were modified. Table 8.3.4 presents the calculation results under the above conditions/assumptions.

**Table 8.3.4 Municipal/City Population Projection**

Municipality/ City	Annual Growth Rate (%)			Population/Growth Rate (%)				
	'80-'90	Land Use Plan	'90-'95	1995	1997		2003	
				Census	Population	Estimated Growth Rate	Population	Estimated Growth Rate
Asuncion	2.50	2.50	0.76	57,072	57,604	0.47	59,107	0.44
Babak	1.51	1.51	2.96	28,726	30,276	2.66	35,372	2.64
Carmen	4.89	4.50	2.59	56,260	58,867	2.29	67,297	2.26
Kapalong	5.01	4.60	1.34	62,183	63,484	1.04	67,413	1.01
Kaputian	0.75	0.75	2.35	26,874	27,990	2.05	31,557	2.03
New Corella	3.78	3.78	2.86	41,615	43,775	2.56	50,845	2.54
Panabo	4.48	4.10	3.46	130,585	138,958	3.16	167,090	3.13
Samal	0.50	0.50	1.53	21,395	21,928	1.24	23,560	1.21
Sto. Tomas	4.32	3.90	2.59	77,182	80,760	2.29	92,327	2.26
Tagum	4.62	4.20	2.94	156,588	164,977	2.64	192,539	2.62
Talaingod	0.88	0.88	10.39	12,853	15,571	10.07	27,629	10.04
<b>Province</b>	<b>3.79</b>	<b>2.99</b>	<b>2.66</b>	<b>671,333</b>	<b>704,191</b>	<b>2.42</b>	<b>814,735</b>	<b>2.45</b>

Note: 1995 population is census results.

For the year 2010 in the long-term, it is assumed that the trend of population growth of the respective municipality/city between 1990 and 2002, which is considered in the Land Use Plan, will be realized in line with the land use plan of the province. Thus, the projected growth rate for the year 2002 by municipality in the Land Use Plan is first applied to project 2010 population from the year 2003. Then, the municipal population estimated initially is adjusted in proportion to the population size of each municipality to the total provincial population, to meet the above mentioned

mentioned provincial population fixed for the year 2010 (941,545 persons). In this adjustment, the growth rates of Kaputian, Samal and Talaingod are fixed (rates used in the Land Use Plan) to avoid negative growth rates (less than -1.0%). Furthermore, the growth rate used in the Land Use Plan for Babak was fixed to avoid negative rate in the calculation process. Table 8.3.5 shows the study process results and the projected population by municipality for the year 2010 and the adjusted growth rates.

**Table 8.3.5 Municipal/City Population for the Year 2010 and Estimated Growth Rates**

Municipality/ City	Population Projection using G.R in Land Use Plan					2010 Population Projection					
	2003 Pop.	G.R. (%)	2010 Pop.	1) Adjusted	2) G.R. (%)	3) Share (%)	4) Adjusted	5) G.R. (%)	6) Share (%)	7) Adjusted	8) G.R. (%)
Asuncion	59,107	2.50	70,277	63,300	0.98	7.3	62,667	0.84	7.6	62,341	0.76
Babak	35,372	1.51	39,286	35,386	0.01	4.1	35,031	-0.14	N.A	39,286	1.51
Carmen	67,297	4.50	91,582	82,489	2.95	9.6	81,664	2.80	10.0	81,240	2.73
Kapalong	67,413	4.60	92,356	83,187	3.05	9.6	82,354	2.90	10.0	81,926	2.82
Kaputian	31,557	0.75	33,261	29,959	-0.74	N.A	33,261	0.75	N.A	33,261	0.75
New Corella	50,845	3.78	65,943	59,396	2.25	6.9	58,801	2.10	7.2	58,496	2.02
Panabo	167,090	4.10	221,363	199,386	2.56	23.1	197,390	2.41	24.1	196,365	2.33
Samal	23,560	0.50	24,396	21,974	-0.99	N.A	24,396	0.50	N.A	24,396	0.50
Sto. Tomas	92,327	3.90	120,680	108,699	2.36	12.6	107,611	2.21	13.1	107,052	2.14
Tagum	192,539	4.20	256,798	231,304	2.66	26.8	228,988	2.51	27.9	227,799	2.43
Talaingod	27,629	0.88	29,383	26,465	-0.61	N.A	29,383	0.88	N.A	29,383	0.88
Province	814,735	2.99	1,045,324	941,545	2.09	100	941,545	2.09	100	941,545	2.09

Note: G.R.: Annual Growth Rate N.A.: Not Applicable

- 1) Adjusted in proportion to municipal population (provincial total of 1,045,324) to meet the fixed figure of 941,545.
- 2) Estimated growth rates of municipalities between 2003 and 2010 using the adjusted population <sup>1)</sup>
- 3) Proportion of the municipal population (excluding three municipalities having negative growth rates) to the total population of 863,147 <sup>1)</sup>
- 4) Population from adjusted population <sup>1)</sup> for Kaputian, Samal and Talaingod (figures in Land Use Plan are used) to avoid negative growth rates. The population of the remaining municipalities is modified proportionally (share of 3) ) to meet a total of 854,505.
- 5) Estimated growth rates of municipalities between 2003 and 2010 using modified population <sup>4)</sup>
- 6) Proportion of the municipal population (excluding Babak, Kaputian, Samal and Talaingod) to total population of 815,219 <sup>4)</sup>
- 7) Municipal population: modified for the 4 municipalities using G.R. in Land Use Plan and rearranged for the other municipalities to meet the population of 941,545 using the shares <sup>6)</sup>
- 8) Estimated growth rates of municipalities between 2003 and 2010 applying finally adjusted population <sup>7)</sup>

Table 8.3.6 presents a summary of the past and projected population by target year that is re-arranged to meet the current composition of municipalities/cities of the province.

#### Population by urban and rural area

In the Land Use Plan, the urban/rural population by municipality for the year 2002 is projected with 1990 as base year. The annual growth rate of the urban population for the year 2002 by municipality is estimated by the PPDO referring to the trend from 1980 to 1990 and the future land use plan. The provincial average growth rate is set at 5.1%.



The rural population by municipality is estimated as the balance between the total population and the urban population. The average growth rate of the province (3.2%) is estimated to be almost half of the urban area.

**Table 8.3.6 Past and Projected Population by Current Municipality/City**

Municipality/ City	Past Pop. Development			Pop. Projection			
	1980	1990	1995	1997	1998	2003	2010
Asuncion	42,915	54,954	57,072	57,604	57,881	59,107	62,341
Braulio E. Dujali <sup>1)</sup>					15,577	17,887	21,220
Carmen	30,719	49,507	56,260	58,867	54,653	61,071	73,724
Island Garden City of Samal	62,423	68,573	76,995	80,194	81,859	90,490	96,943
Kapalong	42,869	66,030	62,183	63,484	64,154	67,413	81,926
New Corella	24,926	36,138	41,615	43,775	44,903	50,845	58,496
Panabo	71,098	110,172	130,588	138,958	133,360	155,429	182,662
Sto. Tomas	44,512	67,916	77,182	80,760	82,622	92,327	107,052
Tagum City	86,201	135,440	156,588	164,977	169,364	192,539	227,799
Talaingod			128,533	15,571	17,141	27,629	29,383
<b>Province</b>	<b>405,663</b>	<b>588,733</b>	<b>671,333</b>	<b>704,191</b>	<b>721,514</b>	<b>814,735</b>	<b>941,545</b>

Notes: 1) Population of Braulio E. Dujali is calculated using the population percentage of related barangays to mother municipalities in 1995 (9.3% of Carmen and 9.7% of Panabo in 1995).  
 2) 1980-1997 population of Island Garden City of Samal represents total population of previous Babak, Kaputian and Samal.  
 3) The population in 1998 (the year when re-arrangements of some municipalities were made) for the relevant municipalities was estimated using the growth rates adopted between 1995 and 2003.

The urban and rural population by municipality/city was studied considering the 1995 census results and the estimated figures in the Land Use Plan.

1) Past population development

Table 8.3.7 shows the urban and rural population with growth rates in census years (1980-1995) by municipality. With regard to the urban population of the province to the total population, the provincial averages in 1980 and 1990 were 23.9% and 28.3%, and it increased to 30.4% in 1995. The growth rates of Kaputian and Panabo from 1990 to 1995 showed considerable increase. Regarding the growth rate of the urban population, the provincial average (5.55% between 1980 and 1990) was reduced to 4.13% in 1995.

Also, the rural population by municipality/city had decreased with a growth rate of 2.06% from 1990 to 1995 as a provincial average.

The projection of the urban and rural population for the years 1997, 2003 and 2010.

The urban population by municipality/city for the target years was first projected and the rural population was calculated to meet the aforementioned total population by smoothing the urban population.

Table 8.3.7 Past Population Development by Urban and Rural Area

Municipality City	1980			1990				1995				
	Total	Urban/ Rural	Share (%)	Total	Urban/ Rural	G.R. (%)	Share (%)	Total	Urban/ Rural	G.R. (%)	Share (%)	
Urban Area	Asuncion	42,915	5,008	11.7	54,954	6,129	2.04	11.2	57,072	7,223	3.34	12.7
	Babak	21,368	5,333	25.0	24,824	6,678	2.27	26.9	28,726	7,686	2.85	26.8
	Carmen	30,719	4,630	15.1	49,507	8,292	6.00	16.7	56,260	8,142	-0.36	14.5
	Kapalong	35,688	4,325	12.1	58,189	7,747	6.00	13.3	62,183	9,910	5.05	15.9
	Kaputian	22,192	3,550	16.0	23,923	2,076	-5.22	8.7	26,874	3,595	11.61	13.4
	New Corella	24926	4,915	19.7	36138	6,746	3.22	18.7	41615	7,775	2.88	18.7
	Panabo	71098	14,067	19.8	110172	25,964	6.32	23.6	130585	43,504	10.87	33.3
	Samal	18863	3,570	18.9	19826	4,027	1.21	20.3	21395	4,426	1.91	20.7
	Sto. Tomas	44512	14,941	33.6	67916	22,230	4.05	32.7	77182	27,484	4.33	35.6
	Tagum	86201	35,785	41.5	135440	75,591	7.76	55.8	156588	84,163	2.17	53.7
	Talaingod	7181	0	0.0	7841	0	N.A	0.0	12853	0	N.A	0.0
	Province	405,663	96,994	23.9	588,730	166,52	5.55	28.3	671,333	203,90	4.13	30.4
	Rural Area	Asuncion	42,915	37,907	88.3	54,954	48,825	2.56	88.8	57,072	49,849	0.42
Babak		21,368	16,035	75.0	24,824	18,146	1.24	73.1	28,726	21,040	3.00	73.2
Carmen		30,719	26,089	84.9	49,507	41,215	4.68	83.3	56,260	48,118	3.15	85.5
Kapalong		35,688	31,363	87.9	58,189	50,442	4.87	86.7	62,183	52,273	0.72	84.1
Kaputian		22,192	18,642	84.0	23,923	21,847	1.60	91.3	26,874	23,279	1.28	86.6
New Corella		24926	20,011	80.3	36138	29,392	3.92	81.3	41615	33,840	2.86	81.3
Panabo		71098	57,031	80.2	110172	84,208	3.97	76.4	130585	87,081	0.67	66.7
Samal		18863	15,293	81.1	19826	15,799	0.33	79.7	21395	16,969	1.44	79.3
Sto. Tomas		44512	29,571	66.4	67916	45,686	4.45	67.3	77182	49,698	1.70	64.4
Tagum		86201	50,416	58.5	135440	59,849	1.73	44.2	156588	72,425	3.89	46.3
Talaingod		7181	6,311	87.9	7841	6,797	0.74	86.7	12853	12,853	13.59	100.0
Province		405,663	308,669	76.1	588,730	422,20	3.18	71.7	671,333	467,42	2.06	69.6

Notes: Provincial average growth rates are modified to meet current Davao del Norte  
1980-1990 population of Talaingod represents the population of related barangays of mother municipality

In the projection of the municipal urban population, the following are assumed by short/medium-term and long-term purpose.

- Short/Medium-term target: 1997 and 2003  
Census results in 1995 are applied in terms of the share of urban population to the total population by municipality.
- Long-term target: 2010  
It is anticipated that the share between the urban and rural population will be regulated to meet the land use plan in the long-term period. The growth rate of the urban population by municipality, which is used for the projection in the year 2002 in the Land Use Plan, is employed with 2003 as base year.

Under the above assumptions, the provincial average share of the urban population for the year 2010 was arrived at 37.2%, higher than the figure in 1995 (30.4%). Table 8.3.8 presents the projected urban and rural population. The growth rates and shares on the rural population are calculated using the estimated rural population.

Table 8.3.9 shows the summary of past and projected population by urban and rural area according to the composition of current municipalities/cities.

Table 8.3.8 Population Projection by Urban and Rural Area : 1997, 2003 and 2010

Municipality/ City	1997			2003			2010			
	Total	Urban/ Rural	Share (%)	Total	Urban/ Rural	Share (%)	Total	Urban/ Rural	G.R. (%)	Share (%)
<b>Urban Area</b>										
Asuncion	57,604	7,290	12.7	59,107	7,481	12.7	62,341	10,456	4.90	16.8
Babak	30,276	8,101	26.8	35,372	9,464	26.8	39,286	13,496	5.20	34.4
Carmen	58,867	8,519	14.5	67,297	9,739	14.5	81,240	13,796	5.10	17.0
Kapalong	63,484	10,117	15.9	67,413	10,743	15.9	81,926	15,218	5.10	18.6
Kaputian	27,990	3,744	13.4	31,557	4,221	13.4	33,261	5,481	3.80	16.5
New Corella	43,775	8,179	18.7	50,845	9,499	18.7	58,496	12,927	4.50	22.1
Panabo	138,958	46,293	33.3	167,090	55,665	33.3	196,365	80,440	5.40	41.0
Samal	21,928	4,536	20.7	23,560	4,874	20.7	24,396	6,858	5.00	28.1
Sto. Tomas	80,760	28,758	35.6	92,327	32,877	35.6	107,052	43,556	4.10	40.7
Tagum	164,977	88,672	53.7	192,539	103,486	53.7	227,799	147,568	5.20	64.8
Talaingod	15,571	0	0.0	27,629	0	0.0	29,383	0	0.0	0.0
<b>Province</b>	<b>704,191</b>	<b>214,210</b>	<b>30.4</b>	<b>814,735</b>	<b>248,051</b>	<b>30.4</b>	<b>941,545</b>	<b>349,795</b>	<b>5.03</b>	<b>37.2</b>
<b>Rural Area</b>										
Asuncion	57,604	50,314	87.3	59,107	51,627	87.3	62,341	51,885	0.07	83.2
Babak	30,276	22,175	73.2	35,372	25,908	73.2	39,286	25,790	-0.07	65.6
Carmen	58,867	50,348	85.5	67,297	57,557	85.5	81,240	67,444	2.29	83.0
Kapalong	63,484	53,367	84.1	67,413	56,669	84.1	81,926	66,708	2.36	81.4
Kaputian	27,990	24,246	86.6	31,557	27,336	86.6	33,261	27,780	0.23	83.5
New Corella	43,775	35,596	81.3	50,845	41,346	81.3	58,496	45,569	1.40	77.9
Panabo	138,958	92,665	66.7	167,090	111,424	66.7	196,365	115,926	0.57	59.0
Samal	21,928	17,392	79.3	23,560	18,686	79.3	24,396	17,538	-0.90	71.9
Sto. Tomas	80,760	52,002	64.4	92,327	59,450	64.4	107,052	63,497	0.95	59.3
Tagum	164,977	76,305	46.3	192,539	89,053	46.3	227,799	80,232	-1.48	35.2
Talaingod	15,571	15,571	100.0	27,629	27,629	100.0	29,383	29,383	0.88	100.0
<b>Province</b>	<b>704,191</b>	<b>489,980</b>	<b>69.6</b>	<b>814,735</b>	<b>566,685</b>	<b>69.6</b>	<b>941,545</b>	<b>591,750</b>	<b>0.62</b>	<b>62.8</b>

Table 8.3.9 Past and Projected Population by Urban and Rural Area of Current Municipality/City

Municipality	Past Pop. Development			Pop. Projection		
	1980	1990	1995	1997	2003	2010
<b>Urban Area</b>						
Asuncion	5,008	6,129	7,223	7,290	7,481	10,456
Braulio E. Dujali					0	0
Carmen	4,630	8,292	8,142	8,519	9,739	13,796
Island Garden City of	12,453	12,781	15,707	16,381	18,560	25,835
Kapalong	5,195	11,950	9,910	10,117	10,743	15,218
New Corella	4,915	6,746	7,775	8,179	9,499	12,927
Panabo	14,067	25,964	43,504	46,293	55,665	80,440
Sto. Tomas	14,941	22,230	27,484	28,758	32,877	43,556
Tagum City	35,785	75,591	84,163	88,672	103,486	147,568
Talaingod			0	0	0	0
<b>Province</b>	<b>96,994</b>	<b>166,524</b>	<b>203,908</b>	<b>214,210</b>	<b>248,051</b>	<b>349,795</b>
<b>Rural Area</b>						
Asuncion	37,907	48,825	49,849	50,314	51,627	51,885
Braulio E. Dujali	0	0	0	0	17,887	21,220
Carmen	26,089	41,215	48,118	50,348	51,331	59,928
Island Garden City of	49,970	55,792	61,288	63,808	71,930	71,108
Kapalong	37,674	54,080	52,273	53,367	56,669	66,708
New Corella	20,011	29,392	33,840	35,596	41,346	45,569
Panabo	57,031	84,208	87,081	92,665	99,764	102,222
Sto. Tomas	29,571	45,686	49,698	52,002	59,450	63,497
Tagum City	50,416	59,849	72,425	76,305	89,053	80,232
Talaingod			12,853	15,571	27,629	29,383
<b>Province</b>	<b>308,669</b>	<b>422,206</b>	<b>467,425</b>	<b>489,980</b>	<b>566,685</b>	<b>591,750</b>

Note: Urban/rural population of Island Garden City of Samar from 1980 to 1997 represents summation of Babak, Kaputian and Samar.

### 8.3.2 School Enrollment Projection

Table 8.3.10 Projected School Enrollment by Municipality by Target Year

Name of Municipality	1998						2003						2010					
	School Age Population	Total Enrollment		Public School Enrollment		School Age Population	Total Enrollment	Public School Enrollment		School Age Population	Total Enrollment	Public School Enrollment		School Age Population	Total Enrollment	Public School Enrollment		
		Number	Participation Rate	Number	Participation Rate			Number	Participation Rate			Number	Participation Rate			Number	Participation Rate	Number
Asuncion	16,814	14,899	89	14,682	87	17,170	15,206	88.56	14,993	87.32	18,109	16,037	88.56	15,813	87.32			
Braulio E. Dujali	5,432	5,101	94	4,986	92	6,238	5,858	93.91	5,726	91.79	7,400	6,949	93.91	6,792	91.79			
Carmen	15,234	11,313	74	11,313	74	17,023	12,658	74.36	12,658	74.36	20,550	15,281	74.36	15,281	74.36			
Island Garden City of Samal	22,165	19,920	90	18,841	85	24,502	22,020	89.87	20,827	85.00	26,249	23,590	89.87	22,312	85.00			
Kapalong	18,535	16,296	88	15,447	83	19,477	17,124	87.92	16,232	83.34	23,670	20,811	87.92	19,727	83.34			
New Corella	12,882	10,521	82	10,055	78	14,587	11,913	81.67	11,385	78.05	16,782	13,706	81.67	13,098	78.05			
Panabo	36,073	32,231	89	29,510	82	42,043	37,565	89.35	34,395	81.81	49,409	44,147	89.35	40,422	81.81			
Santo Tomas	23,662	20,149	85	18,835	80	26,441	22,515	85.15	21,047	79.60	30,658	26,105	85.15	24,404	79.60			
Tagum City (Capital)	44,353	42,164	95	37,874	85	50,422	47,931	95.06	43,055	85.39	59,656	56,709	95.06	50,940	85.39			
Talaingod	5,030	1,757	35	1,757	35	8,108	2,832	34.93	2,832	34.93	8,623	3,012	34.93	3,012	34.93			
<b>Provincial Total</b>	<b>200,180</b>	<b>174,351</b>	<b>87</b>	<b>163,300</b>	<b>82</b>	<b>226,011</b>	<b>195,622</b>	<b>86.55</b>	<b>183,150</b>	<b>81.04</b>	<b>261,106</b>	<b>226,347</b>	<b>86.69</b>	<b>211,801</b>	<b>81.12</b>			

### 8.3.3 Projection of the Number of Public Utilities

Table 8.3.11 Projected Number of Public Utilities by Municipality by Target Year

Name of Municipality	Type	1998	2003		2010	
		No. of Public Utilities	Proposed Construction	Total	Proposed Construction	Total
Asuncion	Public Market	1		1	1	2
	Bus/Jeepney Terminal	1		1	1	2
	Parks/Playground	2		2	1	3
	Total	4		4	3	7
Braulio E. Dujali	Public Market		2	2		2
	Bus/Jeepney Terminal		2	2		2
	Parks/Playground		2	2		2
	Total		6	6		6
Carmen	Public Market	1		1	1	2
	Bus/Jeepney Terminal	1		1	1	2
	Parks/Playground	1		1	1	2
	Total	3		3	3	6
Island Garden City of Samal	Public Market	4	6	10		10
	Bus/Jeepney Terminal	2	6	8		8
	Parks/Playground	5	2	7		7
	Total	11	14	25		25
Kapalong	Public Market	1		1	1	2
	Bus/Jeepney Terminal		1	1	1	2
	Parks/Playground	1		1	1	2
	Total	2	1	3	3	6
New Corella	Public Market	1		1	1	2
	Bus/Jeepney Terminal	1		1	1	2
	Parks/Playground	1		1	1	2
	Total	3		3	3	6
Panabo	Public Market	2		2	1	3
	Bus/Jeepney Terminal	1	1	2		2
	Parks/Playground	1		1	1	2
	Total	4	1	5	2	7
Santo Tomas	Public Market	1		1	1	2
	Bus/Jeepney Terminal		1	1		1
	Parks/Playground	1		1	1	2
	Total	2	1	3	2	5
Tagum City (Capital)	Public Market	2		2		2
	Bus/Jeepney Terminal	2		2	1	3
	Parks/Playground	1		1	1	2
	Total	5		5	2	7
Talaingod	Public Market	1	1	2		2
	Bus/Jeepney Terminal		1	1		1
	Parks/Playground		1	1		1
	Total	1	3	4		4
Provincial Total	Public Market	14	9	23	6	29
	Bus/Jeepney Terminal	8	12	20	5	25
	Parks/Playground	13	5	18	7	25
	Total	35	26	61	18	79

## 8.4 Types of Facilities and Implementation Criteria

### 8.4.1 Water Supply

#### (1) Urban water supply

With regard to the development/expansion of the urban water supply by municipality, the existing conditions, future requirements and planned/on-going projects were reviewed during the preparation of this PW4SP. Potential water source for future development was also evaluated in Chapter 7, taking into account the possibility to utilize untapped spring sources. The location of the urban area of the respective municipalities/cities was referred to Figure 3.4.1 in Chapter 3. Table 8.4.1 presents the basic figures on the existing service coverage, water sources and future requirements. The following show the results of this rapid study by municipality.

#### Asuncion

There exists one Level III system managed by the LGU, which was modified from Level II (under BWP). Previous deep wells had water quality problems (color and turbidity). Water source is groundwater, however the available quantity is limited (only 200 HHs are served: 15% service coverage). Expansion of the system with augmentation of the water source is urgent. Groundwater is blackish and difficult to develop. The spring source located in Buan, near the boundary of New Corella, which is more than 20km may be studied (technical study). DIDP suggested to develop Panas spring in New Corella (Brgy. Carcor) for the 3 municipalities/city of Tagum, New Corella and Asuncion as an integrated water supply. This idea shall be reflected in the Medium-term Plan. The spring is 23km away from Tagum City and 5km from New Corella Poblacion. The Tagum WD investigated the spring availability in August 1997 and confirmed the discharge rate of 350lps. However, it is necessary to ensure water rights and watershed management.

#### Braulio E. Dujali

There is no urban area. Most of the residents rely on dug wells and depend on water vendors from Davao City. Available water sources are quite limited.

#### Carmen

There is a WD serving the poblacion (only 17% of urban population), but water quality (saline water) and quantity problems are prevalent. No good spring source is available (but, untapped spring is listed with an estimated discharge rate of 600 cu.m/day). For the medium term, the study on the use of the untapped spring in Brgy. Tibulao shall be done

(more than 10km from the poblacion, but quite different elevation between the spring and the service area- gravity flow is ensured).

#### Island Garden City of Samal

The city consists of three (3) administrative districts. In Samal district, there is one WD (created in 1997; flat rate of 30 pesos/connection). There is water quality problem using stream water without treatment. Thus, the residents use shallow wells for drinking purpose. A study is under way by the WD to utilize series of wells.

In Babak district, there is no Level III system in the poblacion area. Currently, a deep well is under construction by the municipality. Individual system may be adopted. But an integrated management in the City shall be sought.

In Kaputian district, there are two Level III (modified from Level II) using corresponding spring sources.

About 50% of the urban population are covered by these systems. Watershed management and protection of spring sources are necessary to solve the inflow of high turbid water to the treatment plant during rainy days. The study shall be conducted to use spring sources in view of economical and environmental aspects.

#### Kapalong

There are two Level III systems; one is managed by the municipality and another, by the RWSA. Service coverage is about 30% of urban population. Water sources are deep wells. These systems were originally constructed as Level II systems. Due to the current deteriorated facilities upgrading must be studied by the LGU.

#### New Corella

There is a WD serving 2,300 persons (27% of urban population). Water source is spring. Due to water source problem, insufficient water supply is prevalent. The system was originally designed as a Level II system. Tapping of spring sources at Panas and Carcor shall be studied to prevent overuse of groundwater and salt water intrusion. The system originally designed as Level II shall be reviewed to provide countermeasures (pipe diameter and water source).

#### Panabo

There is a WD covering 4,600 persons (only 10% of urban population). Water source is a deep well. The remaining residents use Level I facility and/or water peddlers selling

water from Davao City. Expansion of the system is required. Merged system with neighboring municipalities may be studied.

#### Sto. Tomas

There are two Level III systems, the first is managed by the Tibal-og RWSA and the other, a privately owned (banana plantation) with a deep well to serve the Poblacion. Service coverage by these systems is about 45% of the urban population. Groundwater is available (600cum/day/well), thus, an expansion study using deep wells shall be proceeded.

#### Tagum City

There are 2 Level III systems (a WD and a waterworks managed by the RWSA in the urban area). Water sources are deep wells. The WD serves 40,000 persons and practices scheduled water supply according to zone area. This is due to insufficient water source and capacity of the facilities. Request for new connections/installation is suspended because of the above reasons. Another waterworks covers 3,500 persons. Service coverage by the two systems is 48% of the urban population. Aside from these, there is a non-operational Level III system in Apokon. The system was previously managed by a RWSA, but was transferred to the provincial government due to lack of technical capability and well source problem. The system is supposed to be turned over to the WD, however no countermeasures have yet been made by the WD. They use shallow wells and expansion of pipes is under way (WD suspended house connections because of the aforementioned reason).

An integrated water supply using spring water shall be considered as suggested by DIDP.

#### Talaingod

There is no urban area. Service for indigenous people (70% is Ata tribes) shall be considered in the rural area.



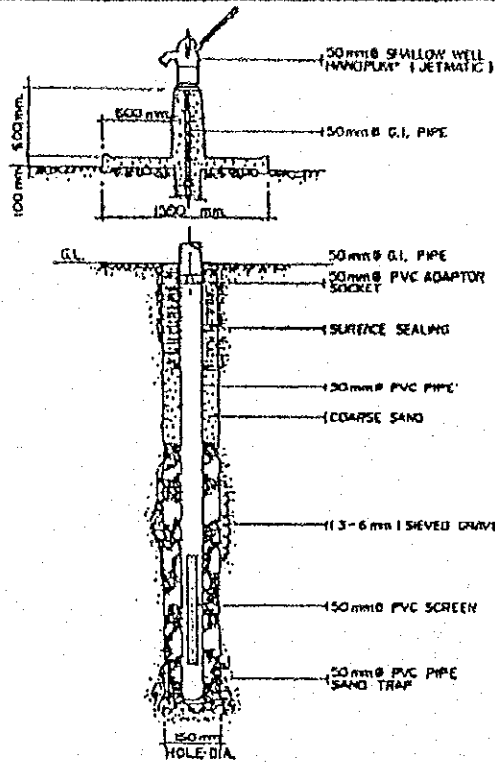
Table 8.4.1 Existing Condition and Future Requirements of Urban Water Supply by Municipality

Name of Municipality/ City	Existing Condition (1997)										Phase I (2003)						Phase II (2010)							
	Urban Population (1997)		Existing Level III System and Others				Level-III Water Source		Urban Population (2003)		Population Served by Level III and Others				Newly Developed/A Additional Water Source Required (m3/d)		Urban Population (2010)		Pop. Served by Level-III		Newly developed/A Additional Water source required (m3/d)			
	No. of Level-III and Operating Bodies	Pop. Served by Level-II	Pop. Served by Level-III	Total Pop. Served	Total (%)	Type	Production (m3/d)	Additional Pop. Served by Level-III	Total Pop. Served by Level-III	%	Total Pop. Served	%	Total Water Source Required (m3/d)	Additional Pop. Served	Total	%	Additional Pop. Served	Total	%	Total Water source required (m3/d)				
Asuncion	7,325	2(Mun/Brgy)	1,200	16%	834	1,638	22%		2,790	DW	2,790	7,481	532	1,732	23%	2,566	34%	10,456	8,201	9,933	95%	1,100	1,300	
Braulio E. Dujali		None																						
Carmen	8,716	1(WD)	1,446	17%		1,446	17%		187	DW	187	9,739	689	2,139	22%	2,139	22%	13,796	10,967	13,106	95%	1,500	1,800	
Island Garden City of Samar	16,733	3(WD,2Brg)	3,990	24%	2,583	6,573	39%			Surf/SP		18,560	1,321	5,311	29%	7,894	43%	25,835	19,232	24,543	95%	2,500	3,200	
Kapalong	10,224	1(Mun)	2,778	27%	4,780	7,558	74%		576	DW	576	10,743	382	3,170	30%	7,950	74%	15,218	11,287	14,457	95%	1,500	1,900	
New Corella	8,389	1(WD)	2,256	27%		2,256	27%		337	SP	337	9,499	676	2,932	31%	2,932	31%	12,927	9,349	12,281	95%	1,300	1,600	
Parabo	47,762	1(WD)	4,500	10%	14,166	18,756	39%		2,444	DW/SP	2,444	55,665	3,962	8,552	15%	22,718	41%	80,440	67,865	76,418	95%	8,983	10,080	
Santo Tomas	29,421	2(Brgy)	15,013	51%	5,769	20,802	71%		3,760	DW	3,760	32,877	2,541	17,574	53%	23,343	71%	43,556	23,804	41,378	95%	3,100	5,400	
Tagum City	91,030	2(WD,Brg)	43,500	48%	26,802	70,392	77%			DW		103,486	9,282	52,882	51%	79,684	77%	147,568	87,307	140,189	95%	11,400	18,360	
Talibago		None																						
<b>Provincial Total</b>	<b>219,600</b>		<b>74,883</b>	<b>34%</b>	<b>54,933</b>	<b>129,421</b>	<b>59%</b>				<b>248,051</b>	<b>19,410</b>	<b>94,293</b>	<b>38%</b>	<b>149,226</b>	<b>68%</b>	<b>31,100</b>	<b>12,800</b>	<b>372,199</b>	<b>259,297</b>	<b>353,589</b>	<b>95%</b>	<b>2,800</b>	<b>46,300</b>

WD: Water District, Pro: Province, Mun: Municipality, Asc: Association

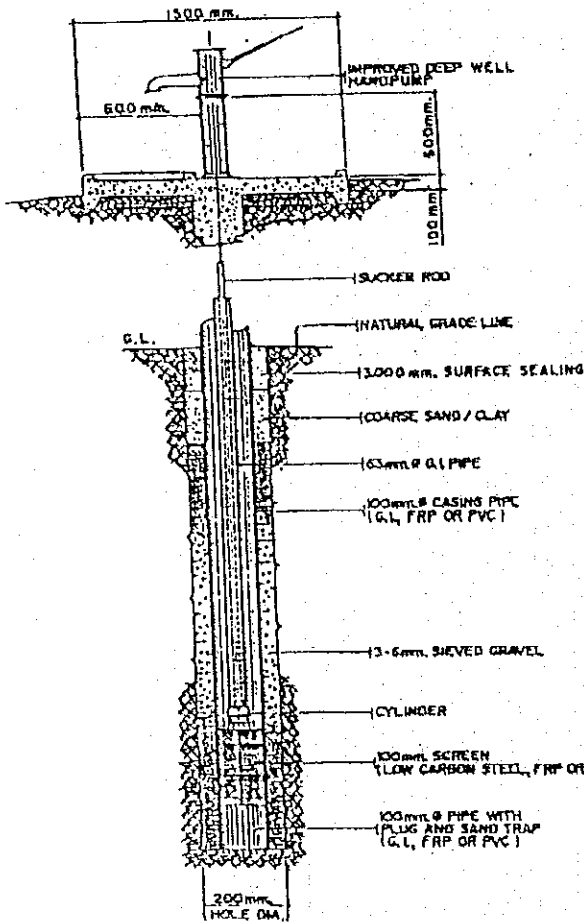
Unit consumption: 100 lpcd

Additional population served in 2010 includes the served population that will be absorbed by Level III system.

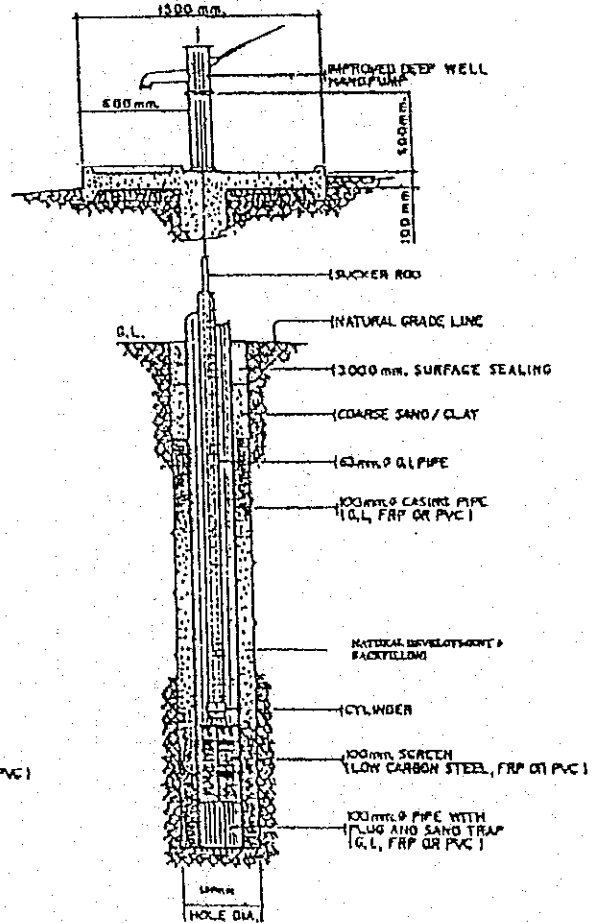


OPEN HOLE DRILLING & GRAVEL PACK METHOD

SHALLOW WELLS



OPEN HOLE DRILLING & GRAVEL PACK METHOD

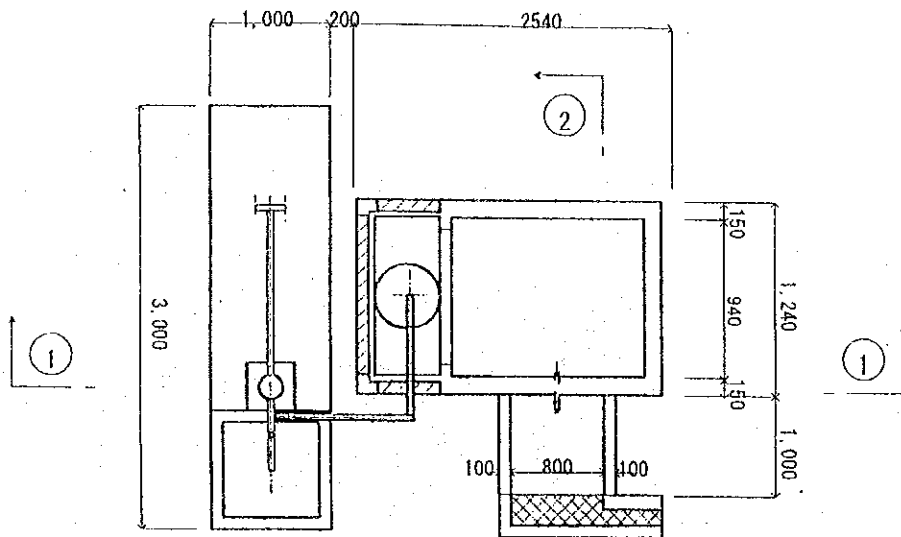


OPEN HOLE DRILLING & NATURAL GRAVEL PACK METHOD

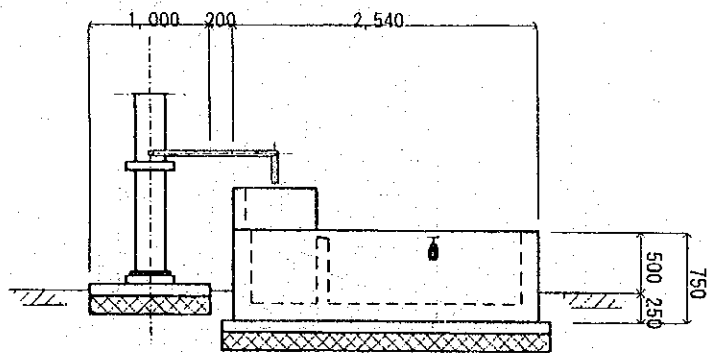
DEEP WELLS

FIGURE 8.4.1

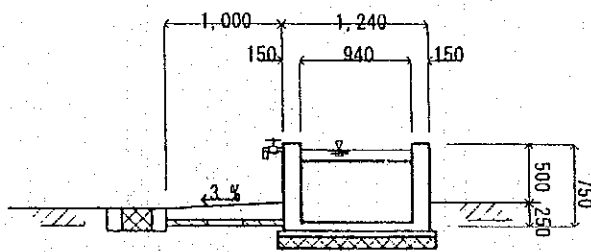
TYPICAL STRUCTURE OF LEVEL I WELL FACILITY



PLAN  $S = 1/30$



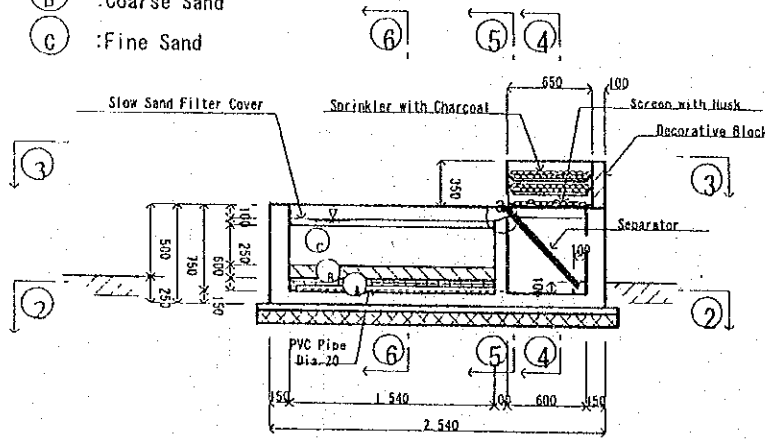
Section ① — ①  $S = 1/30$



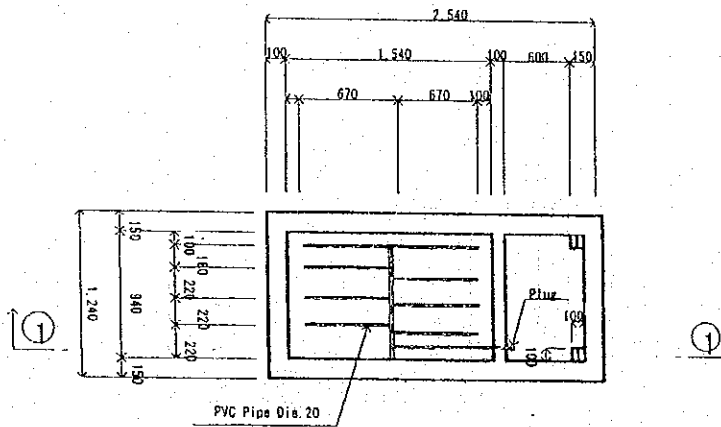
Section ② — ②  $S = 1/30$

Figure 8.4.2(a) Iron Removal Facility

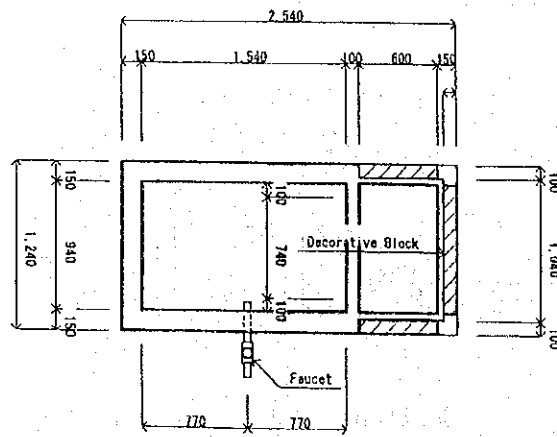
- (A) : Pebble
- (B) : Coarse Sand
- (C) : Fine Sand



Section ① - ①  $S = 1/20$



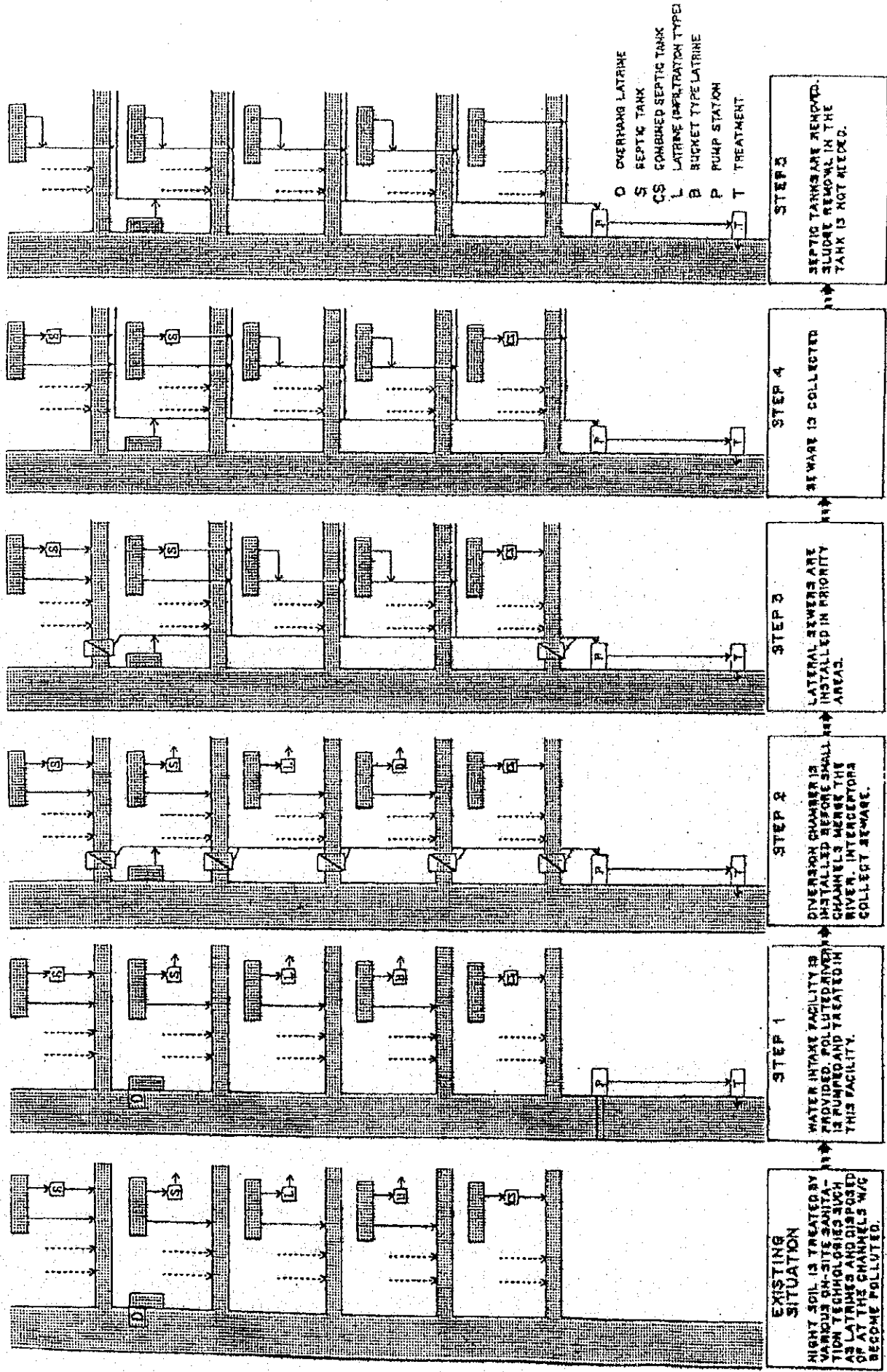
Section ② - ②  $S = 1/20$



Section ③ - ③  $S = 1/20$

Figure 8.4.2(b) Iron Removal Facility

Figure 8.4.3 STAGED IMPROVEMENT IN SEWAGE COLLECTION METHOD



## 8.5 Service Coverage by Target Year

### 8.5.1 Water Supply

#### (1) Population to be served by Level II system in Phase I

Twenty-six (26) untapped spring sources were confirmed to be suitable for Level II systems for rural water supply during the PW4SP preparation as shown in Table 8.5.1.

The conditions and assumptions applied for this estimate are as follows:

#### Source capacity:

The average source capacity of untapped spring was assumed to meet the needs of 100 households based on the review of existing Level II systems with spring sources.

#### Number of system:

Ten (10) out of the 26 untapped springs identified, were considered to serve 10 Level II systems in 10 rural barangays of 3 municipalities.

Table 8.5.1 Population to be Served by Level II System in Phase I

Name of Municipality/ City	Number of Untapped Spring	Number of Barangay to be Served	Number of HHs to be Served	Population to be Served
Asuncion	1	1	100	519
Braulio E. Dujali				
Carmen	1	1	100	507
Island Garden City of Samal				
Kapalong	5			
New Corella	8	8	800	4,288
Panabo				
Santo Tomas				
Tagum City (Capital)				
Talaingod	11			
<b>Provincial Total</b>	<b>26</b>	<b>10</b>	<b>1,000</b>	<b>5,314</b>

#### (2) Population to be served by target year

#### Phase I

For urban area, the additional service coverage was estimated to be served by Level III service. For rural area, the population to be served by Level II systems with untapped springs was first calculated and the rest of the additional service coverage was estimated to be served by Level I facilities.

## Phase II

For urban area, the population served by Level I and II facilities in the base year was considered to be absorbed by Level III service aside from the additional service coverage to be estimated by the sector target. For rural area, all existing facilities in Phase I was assumed to be utilized throughout the future.

The population to be served by target year is exhibited in Table 8.5.2 and Table 8.5.3.

Table 8.5.2 Population to be Served in Phase I (Water Supply)

Name of Municipality	Area	Population Served in the Base Year				Phase I Coverage (2003)											
		Population Served in the Base Year			Total Population	Service Coverage			Additional Population to be Served								
		Level III	Level II	Level I		Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total			
Asuncion	Urban	1,200		834	2,034	7,481	3,655		834	4,489	2,455						2,455
	Rural	552	1,200	13,715	15,467	51,626	552	1,719	20,961	23,232		519	7,246				7,765
	Total	1,752	1,200	14,549	17,501	59,107	4,207	1,719	21,795	27,721	2,455	519	7,246				10,220
Braulio E. Dujali	Urban																
	Rural			691	691	17,887			8,049	8,049			7,358				7,358
	Total			691	691	17,887			8,049	8,049			7,358				7,358
Carmen	Urban	1,446			1,446	9,739	5,843						4,397				4,397
	Rural	1,560		592	2,152	51,332	1,560	507	21,032	23,099		507	20,440				20,947
	Total	3,006		592	3,598	61,071	7,403	507	21,032	28,942		507	20,440				25,344
Island Garden City of Samar	Urban	3,990	756	1,827	6,573	18,560	8,553	756	1,827	11,136							4,563
	Rural	420	14,027	1,724	16,171	71,930	420	14,027	17,922	32,369							16,198
	Total	4,410	14,783	3,551	22,744	90,490	8,973	14,783	19,749	43,505	4,563						20,761
Kapalong	Urban	2,778		4,780	7,558	10,743	2,778		4,780	7,558							
	Rural	1,038	360	31,785	33,183	56,670	1,038	360	31,785	33,183							
	Total	3,816	360	36,565	40,741	67,413	3,816	360	36,565	40,741							
New Corella	Urban	2,256			2,256	9,499	5,699						3,443				3,443
	Rural	1,188	2,880	12,484	16,552	41,346	1,188	7,168	10,250	18,606			4,288				4,288
	Total	3,444	2,880	12,484	18,808	50,845	6,887	7,168	10,250	24,305	3,443		4,288				7,731
Panabo	Urban	4,590		14,166	18,756	55,665	19,233		14,166	33,399							14,643
	Rural	2,388	1,380	32,533	36,301	99,764	2,388	1,380	41,126	44,894							8,593
	Total	6,978	1,380	46,699	55,057	155,429	21,621	1,380	55,292	78,293	14,643						23,236
Santo Tomas	Urban	15,033		5,769	20,802	32,877	15,033		5,769	20,802							
	Rural	780	3,000	31,677	35,457	59,450	780	3,000	31,677	35,457							
	Total	15,813	3,000	37,446	56,259	92,327	15,813	3,000	37,446	56,259							
Tagum City (Capital)	Urban	43,590		26,802	70,392	103,486	43,590		26,802	70,392							
	Rural	47,844		5,473	53,317	89,053	47,844		5,473	53,317							
	Total	91,434		32,275	123,709	192,539	91,434		32,275	123,709							
Talaingod	Urban																
	Rural		660	13,053	13,713	27,629		660	13,053	13,713							
	Total		660	13,053	13,713	27,629		660	13,053	13,713							
Provincial Total	Urban	74,883	756	54,178	129,817	248,050	104,384	756	54,178	159,318	29,501						29,501
	Rural	55,770	23,507	143,727	223,004	566,687	55,770	28,821	201,328	285,919	5,314	59,835					65,149
	Total	130,653	24,263	197,905	352,821	814,737	160,154	29,577	255,506	445,237	29,501	5,314	59,835				94,650



Table 8.5.3 Population to be Served in Phase II (Water Supply)

Name of Municipality	Area	Population Served in 2003						Phase II Coverage (2010)											
		Level III			Level II			Level III			Level II			Level I					
		Level III	Level II	Level I	Total	Total Population	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	
Asuncion	Urban	3,655		834	4,489	10,456	9,933			9,933				9,933	6,278				
	Rural	552	1,719	20,961	23,232	51,885	552	1,719	45,982	48,253				48,253			25,021	25,021	
	Total	4,207	1,719	21,795	27,721	62,341	10,485	1,719	45,982	58,186	6,278			58,186	6,278			25,021	31,299
Braulio E. Dujali	Urban																		
	Rural			8,049	8,049	21,220			19,735	19,735				19,735			11,686	11,686	
	Total			8,049	8,049	21,220			19,735	19,735				19,735			11,686	11,686	
Carmen	Urban	5,843			5,843	13,796	13,106			13,106				13,106	7,263			7,263	
	Rural	1,560	507	21,032	23,099	59,928	1,560	507	53,666	55,733				55,733			32,634	32,634	
	Total	7,403	507	21,032	28,942	73,724	14,666	507	53,666	68,839	7,263			68,839	7,263		32,634	39,897	
Island Garden City of Samar	Urban	8,553	756	1,827	11,136	25,835	24,543			24,543				24,543	15,990			15,990	
	Rural	420	14,027	17,922	32,369	71,108	420	14,027	51,683	66,130				66,130			33,761	33,761	
	Total	8,973	14,783	19,749	43,505	96,943	24,963	14,027	51,683	90,673	15,990			90,673	15,990		33,761	49,751	
Kapalong	Urban	2,778		4,780	7,558	15,218	14,457			14,457				14,457	11,679			11,679	
	Rural	1,038	360	31,785	33,183	66,708	1,038	360	60,640	62,038				62,038			28,855	28,855	
	Total	3,816	360	36,565	40,741	81,926	15,495	360	60,640	76,495	11,679			76,495	11,679		28,855	40,534	
New Corella	Urban	5,699			5,699	12,927	12,281			12,281				12,281	6,582			6,582	
	Rural	1,188	7,168	10,250	18,606	45,569	1,188	7,168	34,023	42,379				42,379			23,773	23,773	
	Total	6,887	7,168	10,250	24,305	58,496	13,469	7,168	34,023	54,660	6,582			54,660	6,582		23,773	30,355	
Panabo	Urban	19,233		14,166	33,399	80,440	76,418			76,418				76,418	57,185			57,185	
	Rural	2,388	1,380	41,126	44,894	102,222	2,388	1,380	91,298	95,066				95,066			50,172	50,172	
	Total	21,621	1,380	55,292	78,293	182,662	78,806	1,380	91,298	171,484	57,185			171,484	57,185		50,172	107,357	
Santo Tomas	Urban	15,033		5,769	20,802	43,556	41,378			41,378				41,378	26,345			26,345	
	Rural	780	3,000	31,677	35,457	63,496	780	3,000	55,271	59,051				59,051			23,594	23,594	
	Total	15,813	3,000	37,446	56,259	107,052	42,158	3,000	55,271	100,429	26,345			100,429	26,345		23,594	49,939	
Tagum City (Capital)	Urban	43,590		26,802	70,392	147,568	140,190			140,190				140,190	96,600			96,600	
	Rural	47,844		5,473	53,317	80,231	47,844			47,844				47,844			21,298	21,298	
	Total	91,434		32,275	123,709	227,799	188,034			188,034				188,034	96,600		21,298	117,898	
Talaingod	Urban																		
	Rural		660	13,053	13,713	29,383			660	26,666	27,326			27,326			13,613	13,613	
	Total		660	13,053	13,713	29,383			660	26,666	27,326			27,326			13,613	13,613	
Provincial Total	Urban	104,384		54,178	159,318	349,796	332,306			332,306				332,306	227,922			227,922	
	Rural	55,770	28,821	201,328	285,919	591,750	55,770	28,821	465,735	550,326				550,326			264,407	264,407	
	Total	160,154	29,577	255,506	445,237	941,546	388,076	28,821	465,735	882,632	227,922			882,632	227,922		264,407	492,329	



Table 8.5.5 Additional Number of Households to be Served in Phase II (Household Toilets)

Name of Municipality	Area	No. households Served in 2003						Phase II Coverage (2010)						
		No. households Served in 2003			Household Coverage			Household Coverage			Additional No. of HHs to be Served			
		Flush	Pour Flush	VIP/Dry	Total	Total No. of HHs	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total
Asuncion	Urban	457	783	65	1,305	2,614	1,242	1,176	65	2,483	785	393		1,178
	Rural	552	6,212	1,691	8,455	12,971	552	9,820	1,691	12,063		3,608		3,608
	Total	1,009	6,995	1,756	9,760	15,585	1,794	10,996	1,756	14,546	785	4,001		4,786
Braulio E. Dujali	Urban													
	Rural		2,578	644	3,222	5,305		4,290	644	4,934		1,712		1,712
	Total		2,578	644	3,222	5,305		4,290	644	4,934		1,712		1,712
Carmen	Urban	596	1,021	85	1,702	3,449	1,639	1,553	85	3,277	1,043	532		1,575
	Rural	861	6,024	1,721	8,606	14,982	1,560	10,652	1,721	13,933	699	4,628		5,327
	Total	1,457	7,045	1,806	10,308	18,431	3,199	12,205	1,806	17,210	1,742	5,160		6,902
Island Garden City of Samar	Urban	1,153	1,977	165	3,295	6,459	3,068	2,903	165	6,136	1,915	926		2,841
	Rural	420	9,114	2,384	11,918	17,777	420	13,729	2,384	16,533	4,615		4,615	
	Total	1,573	11,091	2,549	15,213	24,236	3,488	16,632	2,549	22,669	1,915	5,541		7,456
Kapalong	Urban	655	1,121	94	1,870	3,805	1,808	1,713	94	3,615	1,153	592		1,745
	Rural	977	6,840	1,954	9,771	16,677	1,038	12,518	1,954	15,510	61	5,678		5,739
	Total	1,632	7,961	2,048	11,641	20,482	2,846	14,231	2,048	19,125	1,214	6,270		7,484
New Corella	Urban	561	963	80	1,604	3,232	1,535	1,455	80	3,070	974	492		1,466
	Rural	656	4,590	1,311	6,557	11,392	1,188	8,096	1,311	10,595	532	3,506		4,038
	Total	1,217	5,553	1,391	8,161	14,624	2,723	9,551	1,391	13,665	1,506	3,998		5,504
Panabo	Urban	3,465	5,941	495	9,901	20,110	9,553	9,057	495	19,105	6,088	3,116		9,204
	Rural	1,640	11,482	3,280	16,402	25,556	2,388	18,099	3,280	23,767	748	6,617		7,365
	Total	5,105	17,423	3,775	26,303	45,666	11,941	27,156	3,775	42,872	6,836	9,733		16,569
Santo Tomas	Urban	1,976	3,389	282	5,647	10,889	5,173	4,890	282	10,345	3,197	1,501		4,698
	Rural	780	7,131	1,978	9,889	15,874	780	12,005	1,978	14,763		4,874		4,874
	Total	2,756	10,520	2,260	15,536	26,763	5,953	16,895	2,260	25,108	3,197	6,375		9,572
Tagum City (Capital)	Urban	6,245	10,706	892	17,843	36,892	17,524	16,631	892	35,047	11,279	5,925		17,204
	Rural	1,484	10,390	2,968	14,842	20,058	3,731	11,955	2,968	18,654	2,247	1,565		3,812
	Total	7,729	21,096	3,860	32,685	56,950	21,255	28,586	3,860	53,701	13,526	7,490		21,016
Talaingod	Urban													
	Rural		3,922	981	4,903	7,346		5,851	981	6,832		1,929		1,929
	Total		3,922	981	4,903	7,346		5,851	981	6,832		1,929		1,929
Provincial Total	Urban	15,108	25,901	2,158	43,167	87,450	41,542	39,378	2,158	83,078	26,434	13,477		39,911
	Rural	7,370	68,283	18,912	94,565	147,938	11,657	107,015	18,912	137,584	4,287	38,732		43,019
	Total	22,478	94,184	21,070	137,732	235,388	53,199	146,393	21,070	220,662	30,721	52,209		82,930

Table 8.5.6. Additional Number of Public School Students to be Served in Phases I and II (School Toilets)

Name of Municipality	Std. No. of Public School Student that can be Served in the Base Year (1998)	Projected No. of Public School Student in 2003	Phase I Coverage (2003)		Projected Number of Public School Students in 2010	Phase II Coverage (2010)	
			Public School Students Coverage	Additional No. of Public School Student to be Served		Public School Students Coverage	Additional No. of Public School Students to be Served
Asuncion	9,320	14,993	10,495	1,175	15,813	14,232	3,737
Braulio E. Dujali	2,480	5,726	4,008	1,528	6,792	6,113	2,105
Carmen	6,640	12,658	8,861	2,221	15,281	13,753	4,892
Island Garden City of Samal	7,360	20,827	14,579	7,219	22,312	20,081	5,502
Kapalong	6,720	16,232	11,362	4,642	19,727	17,754	6,392
New Corella	4,080	11,385	7,970	3,890	13,098	11,788	3,818
Panabo	9,200	34,395	24,077	14,877	40,422	36,380	12,303
Santo Tomas	4,920	21,047	14,733	9,813	24,404	21,964	7,231
Tagum City (Capital)	14,840	43,055	30,139	15,299	50,940	45,846	15,707
Talaingod	680	2,832	1,982	1,302	3,012	2,711	729
<b>Provincial Total</b>	<b>66,240</b>	<b>183,150</b>	<b>128,206</b>	<b>61,966</b>	<b>211,801</b>	<b>190,622</b>	<b>62,416</b>

Table 8.5.7 Additional Number of Public Utilities with Sanitary Toilets in Phase I and II

Name of Municipality	Type	Coverage in Base Year (1998)		Phase I Coverage (2003)			Phase I Coverage (2010)		
		No. of PU with Toilets Facilities	No. of PU with Sanitary Toilets	No. of PU with Toilets Facilities	Add'l. No. of Public Utilities with Sanitary Toilets	No. of PU with Sanitary Toilets	No. of PU with Toilets Facilities	Add'l. No. of Public Utilities with Sanitary Toilets	No. of PU with Sanitary Toilets
Asuncion	Public Market	1	1	1		1	2	1	2
	Bus/Jeepney Terminal	1	1	1		1	2	1	2
	Parks/Playground	2	2	2		2	3	1	3
	Total	4	4	4		4	7	3	7
Braulio E. Dujali	Public Market			2	2	2	2		2
	Bus/Jeepney Terminal			2	2	2	2		2
	Parks/Playground			2	2	2	2		2
	Total			6	6	6	6		6
Carmen	Public Market	1	1	1		1	2	1	2
	Bus/Jeepney Terminal	1	1	1		1	2	1	2
	Parks/Playground	1	1	1		1	2	1	2
	Total	3	3	3		3	6	3	6
Island Garden City of Samal	Public Market	4	4	10	6	10	10		10
	Bus/Jeepney Terminal	2	2	8	6	8	8		8
	Parks/Playground	5	5	7	2	7	7		7
	Total	11	11	25	14	25	25		25
Kapaloug	Public Market	1	1	1		1	2	1	2
	Bus/Jeepney Terminal			1	1	1	2	1	2
	Parks/Playground	1	1	1		1	2	1	2
	Total	2	2	3	1	3	6	3	6
New Corella	Public Market	1	1	1		1	2	1	2
	Bus/Jeepney Terminal	1	1	1		1	2	1	2
	Parks/Playground	1	1	1		1	2	1	2
	Total	3	3	3		3	6	3	6
Pauabo	Public Market	2	2	2		2	3	1	3
	Bus/Jeepney Terminal	1	1	2	1	2	2		2
	Parks/Playground	1	1	1		1	2	1	2
	Total	4	4	5	1	5	7	2	7
Santo Tomas	Public Market	1	1	1		1	2	1	2
	Bus/Jeepney Terminal			1	1	1	1		1
	Parks/Playground	1	1	1		1	2	1	2
	Total	2	2	3	1	3	5	2	5
Tagum City (Capital)	Public Market	2	2	2		2	2		2
	Bus/Jeepney Terminal	2	2	2		2	3	1	3
	Parks/Playground	1	1	1		1	2	1	2
	Total	5	5	5		5	7	2	7
Talaingod	Public Market	1	1	2	1	2	2		2
	Bus/Jeepney Terminal			1	1	1	1		1
	Parks/Playground			1	1	1	1		1
	Total	1	1	4	3	4	4		4
Provincial Total	Public Market	14	14	23	9	23	29	6	29
	Bus/Jeepney Terminal	8	8	20	12	20	25	5	25
	Parks/Playground	13	13	18	5	18	25	7	25
	Total	35	35	61	26	61	79	18	79

## 8.6 Facilities, Equipment and Rehabilitation Required to Meet the Target Services

### 8.6.1 Water Supply

#### (1) Required water supply facilities

##### Urban water supply:

Urban water supply facilities required by target year shown in Table 8.6.1 were estimated as the required number of house connections based on the additional service coverage.

As reference, the following requirements were also estimated:

- daily average water demand at 100 lpcd consumption rate, and
- number of deep wells to meet the daily maximum water demand based on the groundwater productivity.

(daily maximum water demand = 1.3 x daily average water demand)

Information pertaining to the expansion plan of Level III systems was arranged to be indicated in Table 8.6.1 and details presented in Table 8.6.2, however, required data were not available during this PW4SP preparation.

##### Rural water supply:

Rural water supply facilities required by target year shown in Table 8.6.3(a) were estimated as the number of Level II systems with number of communal faucets and the number of Level I wells broken-down to deep and shallow wells. Twenty-six (26) untapped springs suitable for Level II system were confirmed during this PW4SP preparation.

#### (2) Required well drilling and rehabilitation equipment

Presently, the PEO has a rotary type drilling rig and the DPWH-DEOs have 4 units of percussion type drilling rigs (2 units are necessary for overhaul) and one unit of rotary type drilling rigs applicable for more than 8" of bore hole diameter.

Taking into account the maximum utilization of existing equipment, additional number of required equipment is estimated as described below.

Applicable type of well drilling equipment is determined considering the geological formation of the province, the easiness to technically operate. Both types of percussion and rotary are suitable for the soft and hard formations, and the percussion type can be easily operated and maintained without special training to drillers compared with the latter, it is very useful to bores in the boulders or cobbles formations. Thus, the drilling equipment of percussion type is recommendable to be selected in the PW4SP preparation.

Table 8.6.1 Urban Water Supply Facilities Required by Target Year

Name of Municipality	Reference on Expansion of Existing Level III System				Phase I (2003) Requirements				Phase II (2010) Requirements							
	Name of Operating Body	Area	No. of Barangay Served	Coverage in 1998 Served Population	Type of Water Source	Plan for Expansion	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (m <sup>3</sup> /day)	Number of Spring Dev't./ Deep Well	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (m <sup>3</sup> /day)	Number of Spring Dev't./ Deep Well		
Asuncion	Asuncion WW	Urban	1	1,200	DW	No	2,455	476	246	1	6,278	1,570	628	1		
		Rural														
		Total	1	1,200												
	Magatos WW	Urban	1	552	DW	No										
		Rural	1	552												
		Total	1	1,200												
Municipal Total	Urban	1	552													
	Rural	1	552													
Eraulio E. Dujali	Not Applicable	Urban	N.A.	N.A.	N.A.	N.A.										
		Rural	N.A.	N.A.												
	Carmen	Carmen WD	Urban	1	1,446	DW/Oth	No	4,397	854	440	1	7,263	1,816	726	1	
			Rural													
		Magsaysay WW	Urban	1	504	DW	No									
			Rural	1	504											
Island Garden City of Samar	Minda WW	Urban	1	1,056	DW	No										
		Rural	1	1,056												
	Municipal Total	Urban	1	1,446												
		Rural	2	1,560												
		Urban	3	3,006												
		Rural	1	2,100												
Kaputian Pob. (South) WW	Samal WD	Urban	1	2,100	Surf	No	4,563	900	456	1	15,990	3,998	1,599	3		
		Rural	1	2,100												
	Kaputian Pob. WW	Urban	1	780	SP	No										
		Rural	1	780												
		Urban	1	1,110												
		Rural	1	1,110												
Toril WW	Toril WW	Urban	1	420	SP	No										
		Rural	1	420												
	Municipal Total	Urban	3	3,990												
		Rural	1	420												
		Urban	4	4,410												
		Rural	1	420												

Table 8.6.1 Urban Water Supply Facilities Required by Target Year (Cont'd.)

Name of Municipality	Reference on Expansion of Existing Level III System				Phase I (2003) Requirements				Phase II (2010) Requirements					
	Name of Operating Body	Area	Coverage in 1998		Type of Water Source	Plan for Expansion	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (m <sup>3</sup> /day)	Spring Dev't./ Deep Well	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (m <sup>3</sup> /day)	Spring Dev't./ Deep Well
			No. of Barangay Served	Served Population										
Kapalong	Gabuyan WW	Urban	1	408	DW	No					2,920	1,168	2	
		Rural	1	408										
		Total	2	816										
	Kapalong LGU WW	Urban	1	636	DW	No								
		Rural	1	636										
		Total	2	1,272										
	Narra WW	Urban	1	630	DW	No								
		Rural	1	630										
		Total	2	1,260										
	Maniki RWW	Urban	1	2,142	DW	No								
Rural		1	2,142											
Total		2	4,284											
Municipal Total	Urban	2	2,778											
	Rural	2	1,038											
	Total	4	3,816											
New Corella	Limbanan WW	Urban	1	1,008	SP	No	3,443	646	344	1	6,582	1,646	658	1
		Rural	1	1,008										
		Total	2	2,016										
	New Corella WD	Urban	1	2,256	SP	No								
		Rural	2	180										
		Total	3	2,436										
	Municipal Total	Urban	1	2,256										
		Rural	3	1,188										
		Total	4	3,444										
	Panabo WD	Urban	4	4,590	DW/SW	No	14,643	2,894	1,464	2	57,185	14,296	5,719	8
Rural		4	2,388											
Total		8	6,978											
Santo Tomas	Kimamon WWA	Urban	1	780	DW	No						6,586	2,635	4
		Rural	1	780										
		Total	2	1,560										
Marcon WW	Urban	1	1,695	DW	No									
	Rural	1	1,695											
	Total	2	3,390											
Tibal-og WW	Urban	1	13,338	DW	No									
	Rural	1	13,338											
	Total	2	26,676											
Municipal Total	Urban	2	15,033											
	Rural	1	780											
	Total	3	15,813											



Table 8.6.1 Urban Water Supply Facilities Required by Target Year (Cont'd.)

Name of Municipality	Reference on Expansion of Existing Level III System				Phase I (2003) Requirements				Phase II (2010) Requirements						
	Name of Operating Body	Area	No. of Barangay Served	Coverage in 1998	Type of Water Source	Plan for Water Expansion	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (m <sup>3</sup> /day)	Number of Spring Dev't./ Deep Well	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (m <sup>3</sup> /day)	Number of Spring Dev't./ Deep Well	
Tagum City (Capital)	Tagum WD	Urban	5	40,050	DW	No					96,600	24,150	9,660	13	
		Rural	6	40,074											
		Total	11	80,124											
	Visayan Vill. WW	Urban	1	3,540	DW	No									
		Rural													
		Total	1	3,540											
	Madaum WW	Urban	1	1,356	DW	No									
		Rural	1	1,356											
		Total	2	2,646											
	La Filipina WW	Urban	2	2,646	DW	No									
		Rural	2	2,646											
		Total	4	5,292											
Makabayan WW	Urban	1	1,344	DW	No										
	Rural	1	1,344												
	Total	2	2,688												
San Miguel WW	Urban	1	1,824	DW	No										
	Rural	1	1,824												
	Total	2	3,648												
Floraville Home WW	Urban	1	600	DW	No										
	Rural	1	600												
	Total	2	1,200												
Municipal Total	Urban	12	47,844												
	Rural	18	91,434												
	Total	30	139,278												
Talaingod	Urban	N.A.	N.A.	N.A.	N.A.										
	Rural	N.A.	N.A.												
	Total														
Provincial Total	Urban	20	74,883				29,501	5,770	2,950	6	227,922	56,982	22,793	33	
	Rural	26	55,770												
	Total	46	130,653												

Table 8.6.2 Plan for Expansion of Existing Level III Systems

Name of Municipality	Name of Operating Body	Additional Areas Barangay to be Covered	Additional Population to be Served	Additional Water Sources	
				Type	Capacity (m <sup>3</sup> /day)
Asuncion	Asuncion WW				
	Magatos WW				
	<b>Municipal Total</b>				
Carmen	Carmen WD				
	Magsaysay WW				
	<b>Municipal Total</b>				
Island Garden City of Samal	Samal WD				
	Kaputian Pob. (South) WW				
	Kaputian Pob. WW				
	Toril WW				
	<b>Municipal Total</b>				
	<b>Municipal Total</b>				
Kapalong	Gabuyan WW				
	Kapalong LGU WW				
	Narra WW				
	<b>Municipal Total</b>				
New Corella	Limbaan WW				
	New Corella WD				
	<b>Municipal Total</b>				
	<b>Municipal Total</b>				
Panabo	Panabo WD				
	Kimamon WWA				
	Marscon WW				
	<b>Municipal Total</b>				
Santo Tomas	Tibal-og WW				
	<b>Municipal Total</b>				
	<b>Municipal Total</b>				
	<b>Municipal Total</b>				
Tagum City (Capital)	Tagum WD				
	Visayan Vill. WW				
	Madaam WW				
	La Filipina WW				
	Makabayan WW				
	San Miguel WW				
	Floraville Home WW				
	<b>Municipal Total</b>				

Table 8.6.3(a) Rural Water Supply Facilities Required by Target Year

Name of Municipality	Phase I (2003) Requirements											Phase II (2010) Requirements				
	Level II		Level I						Level I							
	Number of System	No. of Communal Faucets	Number of Deep Wells			No. of Shallow Wells	Total	Number of Deep Wells			No. of Shallow Wells	Total				
			40 m	80 m	120 m			Sub-total	40 m	80 m			120 m	Sub-total		
Asuncion	1	20	93			93	93	418			418					
Braulio E. Dujali			104			104	104	195			195					
Carmen	1	20	269			269	269	544			544					
Island Garden City of Samar				211		211	211	563			563					
Kapalong	5							145			145					
New Corella	8	160						358			358					
Panabo			111			111	111	837			837					
Santo Tomas								394			394					
Tagum City (Capital)								355			355					
Talaingod	11							46			46					
<b>Provincial Total</b>		26	577	211		788	788	3,246	609		3,855	556			4,411	

Table 8.6.3(b) Rural Water Supply Facilities Required by Target Year

Name of Municipality	Phase I (2003) Requirements											Phase II (2010) Requirements										
	Percentage Allocated to Public Facility (40%)						Percentage Allocated to Public Facility (40%)					Percentage Allocated to Public Facility (40%)					Percentage Allocated to Public Facility (90%) and Percentage Allocated for Public Spring Development (10%)					
	Number of Deep Wells			No. of Spring	Grand Total	Number of Deep Wells			No. of Spring	Grand Total	Number of Deep Wells			No. of Spring	Grand Total	Number of Deep Wells			No. of Spring	Grand Total		
	40 m	80 m	120 m			Sub-total	40 m	80 m			120 m	Sub-total	40 m			80 m	120 m	Sub-total			40 m	80 m
Asuncion	33			33	4	37	33	4	37	150			150	17	167							
Braulio E. Dujali	38			38	4	42	38	4	42	70			70	8	78							
Carmen	97			97	11	108	97	11	108	196			196	22	218							
Island Garden City of Samar		76		76	8	84				202			202	23	225							
Kapalong										52			52	121	192							
New Corella										129			129	14	143							
Panabo	40			40	4	44	40	4	44	301			301	34	335							
Santo Tomas										142			142	16	158							
Tagum City (Capital)										128			128	14	142							
Talaingod										17			17	65	91							
<b>Provincial Total</b>	208	76		284	31	315	284	31	315	1,168	219		1,387	200	1,587	178				1,765		

Medium size percussion drilling rig (truck-mounted type for deep well):

Average performance

- 1 well/30 days (5 m/day of drilling rate with finishing work)

Annual accomplishment

- 9 wells/year (365 days/year ÷ 30 days/well x 0.75)

Required number

- 6 sets for the total 284 deep wells

Well rehabilitation equipment:

Average performance

- 1 well/7 days (well redevelopment and finishing work)

Annual accomplishment

- 39 wells/year (365 days/year ÷ 7 days/well x 0.75)

Required number

- 1 set for 10% of 284 Level I deep wells

Support vehicle:

Type - pick-up truck with winch, double cab

Required number

- 1 unit for well rehabilitation

Considering the utilization of existing percussion and rotary drilling rigs, the following equipment shall be mobilized/procured either by private sector or LGUs to accomplish the physical targets:

- 1 set of medium size percussion rig for the total number of deep wells;
- 1 set of well rehabilitation equipment for 10% of deep wells (at least 1 set shall be held by the provincial government); and
- 1 unit of support vehicle for well rehabilitation.

In addition to the above, service trucks equipped with crane are required for each unit of medium size percussion rig for hauling drilling tools and water.

Table 8.6.4 Urban Household Toilets Required by Target Year

Name of Municipality	Phase I (2003) Requirements						Phase II (2010) Requirements					
	Additional HHs to be Served			No. of HHs to be Served			Additional HHs to be Served			No. of HHs to be Served		
	Flush	Pour Flush	VIP/ Dry	Total	Flush	Pour Flush	VIP/ Dry	Total	Flush	Pour Flush	VIP/ Dry	Total
Asuncion	454			454	454			454	785	393		1,178
Braulio E. Dujali		253		796	543	253		796	1,043	532		1,575
Carmen				1,146	1,146			1,146	1,915	926		2,841
Island Garden City of Sama	527			548	527			548	1,153	592		1,745
Kapalong	561			582	561			582	974	492		1,466
New Corella	2,509	263		2,890	2,509	263		2,890	6,088	3,116		9,204
Panabo	1,801			1,801	1,801			1,801	3,197	1,501		4,698
Santo Tomas	1,009	113		1,387	1,009	113		1,387	11,279	5,925		17,204
Tagum City (Capital)												
Talaingod												
<b>Provincial Total</b>	<b>8,550</b>	<b>629</b>	<b>425</b>	<b>9,604</b>	<b>8,550</b>	<b>629</b>	<b>425</b>	<b>9,604</b>	<b>26,434</b>	<b>13,477</b>		<b>39,911</b>

Table 8.6.5 Rural Household Toilets Required by Target Year

Name of Municipality	Phase I (2003) Requirements						Phase II (2010) Requirements					
	Additional HHs to be Served			No. of HHs to be Served			Additional HHs to be Served			No. of HHs to be Served		
	Flush	Pour Flush	VIP/ Dry	Total	Flush	Pour Flush	VIP/ Dry	Total	Flush	Pour Flush	VIP/ Dry	Total
Asuncion	552			1,998	552			1,998	3,608			3,608
Braulio E. Dujali		539		1,071	539			1,071	1,712			1,712
Carmen	861	1,562		2,423	861	1,562		2,423	699	4,628		5,327
Island Garden City of Sama	380	4,387		4,767	380	4,387		4,767	4,615			4,615
Kapalong	977	4,851		5,828	977	4,851		5,828	61	5,739		5,739
New Corella	656	1,874		2,530	656	1,874		2,530	532	3,506		4,038
Panabo	1,640	3,618		5,258	1,640	3,618		5,258	748	6,617		7,365
Santo Tomas	780	3,307		4,087	780	3,307		4,087	4,874			4,874
Tagum City (Capital)	1,484	2,856		4,340	1,484	2,856		4,340	2,247	1,565		3,812
Talaingod		3,454		3,454		3,454		3,454	1,929			1,929
<b>Provincial Total</b>	<b>7,330</b>	<b>26,448</b>	<b>1,978</b>	<b>35,756</b>	<b>7,330</b>	<b>26,448</b>	<b>1,978</b>	<b>35,756</b>	<b>4,287</b>	<b>38,732</b>		<b>43,019</b>

Table 8.6.6 Public School Toilets Required by Target Year

Name of Municipality	Phase I (2003) Requirements			Phase II (2010) Requirements		
	Additional Public School Students to be Served	No. of Toilet Unit	No. of Toilet Facilities	Additional Public School Students to be Served	No. of Toilet Unit	No. of Toilet Facilities
Asuncion	1,175	30	6	3,737	94	19
Braulio E. Dujali	1,528	39	8	2,105	53	11
Carmen	2,221	56	12	4,892	123	25
Island Garden City of Samal	7,219	181	37	5,502	138	28
Kapalong	4,642	117	24	6,392	160	32
New Corella	3,890	98	20	3,818	96	20
Panabo	14,877	372	75	12,303	308	62
Santo Tomas	9,813	246	50	7,231	181	37
Tagum City (Capital)	15,299	383	77	15,707	393	79
Talaingod	1,302	33	7	729	19	4
<b>Provincial Total</b>	<b>61,966</b>	<b>1,555</b>	<b>316</b>	<b>62,416</b>	<b>1,565</b>	<b>317</b>

Table 8.6.7 Public Toilets Required by Target Year

Name of Municipality	Phase I (2003) Requirements				Phase II (2010) Requirements			
	Number of Public Toilets				Number of Public Toilets			
	Public Market	Bus/ Jeepney Terminal	Parks/ Playground	Total	Public Market	Bus/ Jeepney Terminal	Parks/ Playground	Total
Asuncion					1	1	1	3
Braulio E. Dujali	2	2	2	6				
Carmen					1	1	1	3
Island Garden City of Samal	6	6	2	14				
Kapalong		1		1	1	1	1	3
New Corella					1	1	1	3
Panabo		1		1	1		1	2
Santo Tomas		1		1	1		1	2
Tagum City (Capital)						1	1	2
Talaingod	1	1	1	3				
<b>Provincial Total</b>	<b>9</b>	<b>12</b>	<b>5</b>	<b>26</b>	<b>6</b>	<b>5</b>	<b>7</b>	<b>18</b>