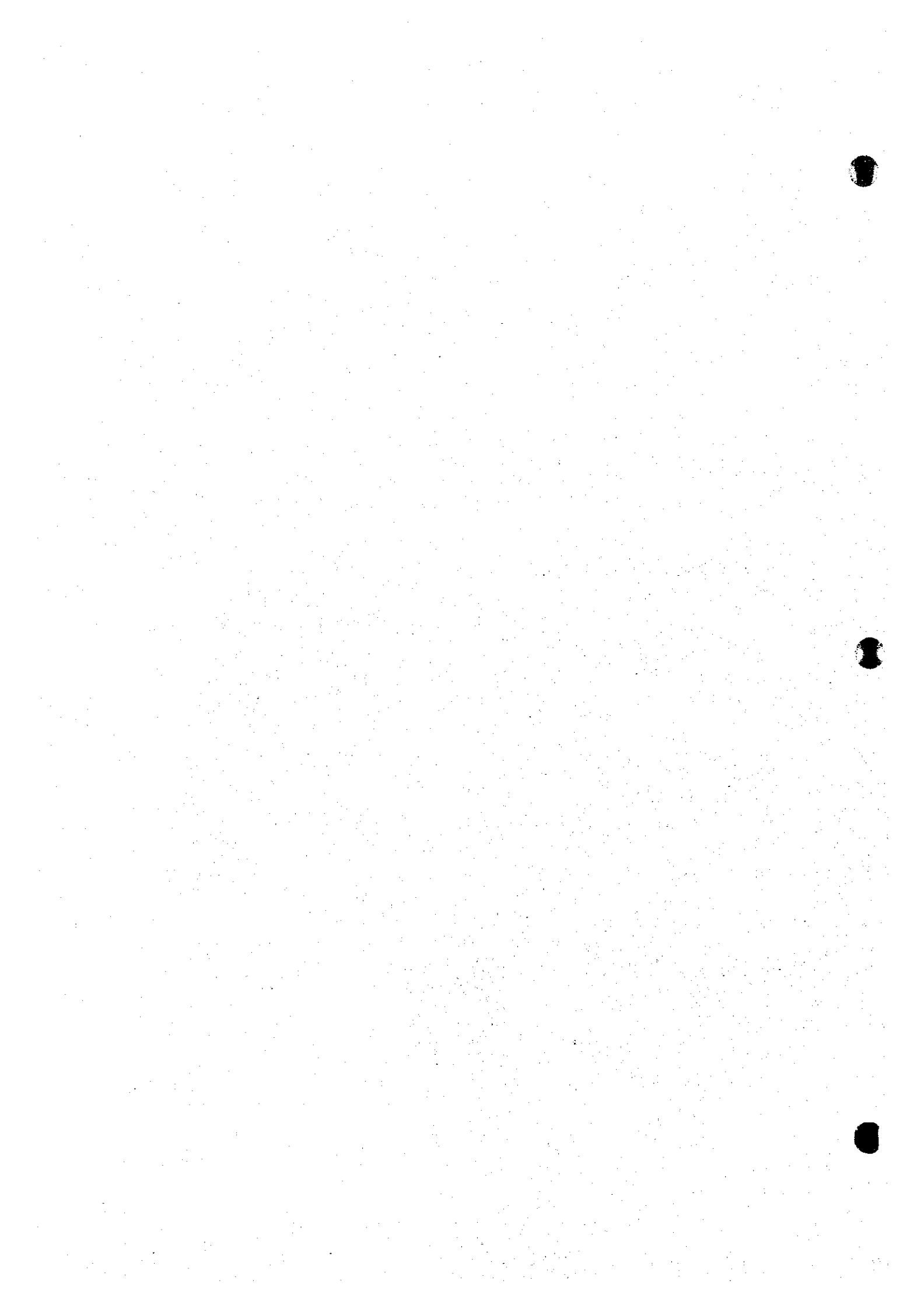

**FUTURE REQUIREMENTS
AND DEVELOPMENT PLAN**

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 (1997)	Population Served by 1997 Facilities			Population Served by Planned/On-going Projects			Population Served in the Base Year (1997)			Percentage Coverage			
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III		Level II	Level I	Total
Baganga	Urban	13,781	2,280	446	3,540	6,266				2,280	446	3,540	6,266	45	
	Rural	27,365		3,882	5,514	9,396					3,882	5,514	9,396	34	
	Total	41,146	2,280	4,328	9,054	15,662				2,280	4,328	9,054	15,662	38	
Banaybanay	Urban	11,045		9,456	9,456						9,456	9,456	86		
	Rural	23,388	1,324	4,144	11,909	17,377				1,324	4,144	11,909	17,377	74	
	Total	34,433	1,324	4,144	21,365	26,833				1,324	4,144	21,365	26,833	78	
Boston	Urban	2,450		782	782						782	782	32		
	Rural	8,335		2,650	322	2,972				2,650	322	2,972	36		
	Total	10,785		2,650	1,104	3,754				2,650	1,104	3,754	35		
Caraga	Urban	5,410	2,021	652	2,673					2,021	652	2,673	49		
	Rural	27,296	1,849	1,540	6,395	9,784				1,849	1,540	6,395	9,784	36	
	Total	32,706	3,870	2,192	6,395	12,457				3,870	2,192	6,395	12,457	38	
Cateel	Urban	5,730		2,330	2,330						2,330	2,330	41		
	Rural	22,373		2,509	7,243	9,752				2,509	7,243	9,752	44		
	Total	28,103		2,509	9,573	12,082				2,509	9,573	12,082	43		
Governor Generoso	Urban	9,846	1,477	4,647	6,124					1,477	4,647	6,124	62		
	Rural	32,876		8,115	9,293	17,408				8,115	9,293	17,408	53		
	Total	42,722	1,477	8,115	13,940	23,532				1,477	8,115	13,940	23,532	55	
Lupon	Urban	18,285	2,825	821	11,025	14,671				2,825	821	11,025	14,671	80	
	Rural	34,158	129	2,488	21,662	24,279				129	2,488	21,662	24,279	71	
	Total	52,443	2,954	3,309	32,687	38,950				2,954	3,309	32,687	38,950	74	
Manay	Urban	8,082	1,500	800	2,300					1,500	800	2,300	28		
	Rural	28,603		351	1,358	1,709				351	1,358	1,709	6		
	Total	36,685	1,500	1,151	1,358	4,009				1,500	1,151	1,358	4,009	11	
Mati (Capital)	Urban	43,698	14,528	162	16,627	31,317				14,528	162	16,627	31,317	72	
	Rural	52,620	3,049	19,495	5,322	27,866				3,049	19,495	5,322	27,866	53	
	Total	96,318	17,577	19,657	21,949	59,183				17,577	19,657	21,949	59,183	61	
San Isidro	Urban	9,458	2,160	800	2,805	5,765				2,160	800	2,805	5,765	61	
	Rural	21,838	160	3,991	7,414	11,565				160	3,991	7,414	11,565	53	
	Total	31,296	2,320	4,791	10,219	17,330				2,320	4,791	10,219	17,330	55	
Tarragona	Urban	4,608		1,500	38	1,538					1,500	38	1,538	33	
	Rural	15,997		3,005	1,996	5,001				3,005	1,996	5,001	31		
	Total	20,605		4,505	2,034	6,539				4,505	2,034	6,539	32		
Provincial Total	Urban	132,393	26,791	5,181	51,250	83,222				26,791	5,181	51,250	83,222	63	
	Rural	294,849	6,511	52,170	78,428	137,109				6,511	52,170	78,428	137,109	47	
	Total	427,242	33,302	57,351	129,678	220,331				33,302	57,351	129,678	220,331	52	

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 1997 Facilities				1997		2003	
		Level III	Level II	Level I	Total	Total Population	Coverage (%)	Total Population	Coverage (%)
Baganga	Urban	2,280	446	3,540	6,266	13,781	45	15,310	41
	Rural		3,882	5,514	9,396	27,365	34	30,404	31
	Total	2,280	4,328	9,054	15,662	41,146	38	45,714	34
Banaybanay	Urban			9,456	9,456	11,045	86	12,459	76
	Rural	1,324	4,144	11,909	17,377	23,388	74	26,382	66
	Total	1,324	4,144	21,365	26,833	34,433	78	38,841	69
Boston	Urban			782	782	2,450	32	2,719	29
	Rural		2,650	322	2,972	8,335	36	9,248	32
	Total		2,650	1,104	3,754	10,785	35	11,967	31
Caraga	Urban	2,021	652		2,673	5,410	49	6,000	45
	Rural	1,849	1,540	6,395	9,784	27,296	36	30,274	32
	Total	3,870	2,192	6,395	12,457	32,706	38	36,274	34
Cateel	Urban			2,330	2,330	5,730	41	6,326	37
	Rural		2,509	7,243	9,752	22,373	44	24,703	39
	Total		2,509	9,573	12,082	28,103	43	31,029	39
Governor Generoso	Urban	1,477		4,647	6,124	9,846	62	10,823	57
	Rural		8,115	9,293	17,408	32,876	53	36,137	48
	Total	1,477	8,115	13,940	23,532	42,722	55	46,960	50
Lupon	Urban	2,825	821	11,025	14,671	18,285	80	20,310	72
	Rural	129	2,488	21,662	24,279	34,158	71	37,941	64
	Total	2,954	3,309	32,687	38,950	52,443	74	58,251	67
Manay	Urban	1,500	800		2,300	8,082	28	8,988	26
	Rural		351	1,358	1,709	28,603	6	31,809	5
	Total	1,500	1,151	1,358	4,009	36,685	11	40,797	10
Mati (Capital)	Urban	14,528	162	16,627	31,317	43,698	72	47,488	66
	Rural	3,049	19,495	5,322	27,866	52,620	53	57,185	49
	Total	17,577	19,657	21,949	59,183	96,318	61	104,673	57
San Isidro	Urban	2,160	800	2,805	5,765	9,458	61	10,465	55
	Rural	160	3,991	7,414	11,565	21,838	53	24,163	48
	Total	2,320	4,791	10,219	17,330	31,296	55	34,628	50
Tarragona	Urban		1,500	38	1,538	4,608	33	5,210	30
	Rural		3,005	1,996	5,001	15,997	31	18,090	28
	Total		4,505	2,034	6,539	20,605	32	23,300	28
Provincial Total	Urban	26,791	5,181	51,250	83,222	132,393	63	146,098	57
	Rural	6,511	52,170	78,428	137,109	294,849	47	326,336	42
	Total	33,302	57,351	129,678	220,331	427,242	52	472,434	47

Table 8.2.3 Number of Households Served by Sanitary Toilets in the Base Year (1997)

Name of Municipality	Area	Population (1997)	Number of Households (1997)	Households Using Sanitary Toilets in 1997				Recipient HHs of Planned/On-going Projects				Households Using Sanitary Toilets in the Base Year (1997)					
				Flush Toilets	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Coverage (%)	
																Pour Flush	VIP/Dry
Baganga	Urban	13,781	2,533	158	1,310	1,468	200	158	1,510	6	1,668	6	60	66			
	Rural	27,365	5,242	158	4,296	4,296	5	5	4,296	5	4,301	5	82	82			
	Total	41,146	7,775	316	5,606	5,764	205	163	5,806	11	5,969	11	75	75			
Banybanay	Urban	11,045	2,061	350	990	1,340	200	350	1,190	17	1,540	17	72	75			
	Rural	23,388	4,291	3,107	3,107	3,107	5	5	3,107	5	3,112	5	72	73			
	Total	34,433	6,352	350	4,097	4,447	205	355	4,297	22	4,652	22	68	73			
Boston	Urban	2,450	457	34	187	221	200	34	387	7	421	7	85	92			
	Rural	8,335	1,440	871	371	1,092	5	5	871	5	876	5	60	61			
	Total	10,785	1,897	945	1,058	1,092	205	34	1,258	12	1,297	12	66	68			
Caraga	Urban	5,410	1,044	127	335	462	200	127	555	12	662	12	51	43			
	Rural	27,296	5,170	1,277	4,679	4,679	5	5	4,679	5	4,684	5	91	91			
	Total	32,706	6,214	1,277	5,014	5,141	205	127	5,214	17	5,346	17	84	86			
Cateel	Urban	5,730	1,071	95	556	651	200	95	756	9	851	9	71	79			
	Rural	22,373	4,198	371	3,016	3,016	5	5	3,016	5	3,021	5	72	72			
	Total	28,103	5,269	466	3,572	3,667	205	95	3,772	14	3,872	14	72	73			
Governor Generoso	Urban	9,846	1,868	107	1,012	1,119	200	107	1,212	6	1,319	6	65	71			
	Rural	32,876	6,250	4,567	4,567	4,567	5	5	4,567	5	4,572	5	73	73			
	Total	42,722	8,118	107	5,579	5,686	205	107	5,779	11	5,891	11	71	73			
Lupon	Urban	18,285	3,424	371	910	1,281	200	371	1,110	11	1,481	11	32	43			
	Rural	34,158	6,556	6,194	6,194	6,194	5	5	6,194	5	6,199	5	94	95			
	Total	52,443	9,980	371	7,104	7,475	205	371	7,304	16	7,680	16	73	77			
Manay	Urban	8,082	1,513	238	503	741	200	238	703	16	941	16	46	71			
	Rural	28,603	5,532	3,925	3,925	3,925	5	5	3,925	5	3,930	5	71	71			
	Total	36,685	7,045	238	4,428	4,666	205	238	4,628	21	4,871	21	66	66			
Mati (Capital)	Urban	43,698	8,551	2,606	1,802	4,408	200	2,606	2,602	30	4,608	30	23	54			
	Rural	52,620	10,158	5,317	2	5,319	5	5	5,317	7	5,324	7	52	52			
	Total	96,318	18,709	2,606	7,119	9,727	205	2,606	7,319	14	9,932	14	39	53			
San Isidro	Urban	9,458	1,805	227	771	998	200	227	971	13	1,198	13	54	66			
	Rural	21,838	4,067	3,751	3,751	3,751	5	5	3,751	5	3,756	5	92	92			
	Total	31,296	5,872	4,522	4,522	4,522	205	227	4,722	18	4,954	18	80	84			
Tarragona	Urban	4,608	893	65	172	237	200	65	372	7	437	7	42	49			
	Rural	15,997	3,059	2,382	2,382	2,382	5	5	2,382	5	2,387	5	78	78			
	Total	20,605	3,952	2,619	2,619	2,619	205	65	2,754	12	2,824	12	70	71			
Provincial Total	Urban	132,393	25,220	43,78	8,548	12,926	2,200	4,378	10,748	17	15,126	17	43	60			
	Rural	294,849	55,963	42,105	42,105	42,107	55	55	42,105	57	42,162	57	75	75			
	Total	427,242	81,183	43,78	50,653	55,033	2,200	4,378	52,853	74	57,288	74	65	71			

Table 8.2.4 Number of Public School Student Served by School Toilets in Base Year (1997)

Name of Municipality	1997 Total Number of Public School Student	Standard No. of Student that can be Served by 1997	No. of Student to be Served by Planned /On-going Projects	Standard No. of Students that can be Served by Toilets in Base Year (1997)	Coverage (%)
Baganga	10,256	3,280	0	3,280	32
Banaybanay	7,766	7,766	0	7,766	100
Boston	3,407	480	0	480	14
Caraga	8,990	3,040	0	3,040	34
Cateel	7,517	3,560	0	3,560	47
Governor Generoso	11,213	3,640	0	3,640	32
Lupon	12,856	7,120	0	7,120	55
Manay	8,416	4,040	0	4,040	48
Mati (Capital)	25,123	16,320	0	16,320	65
San Isidro	7,696	5,840	0	5,840	76
Tarragona	4,293	2,120	0	2,120	49
Provincial Total	107,533	57,206	0	57,206	53

Table 8.2.5 Number of Public Utilities with Sanitary Toilets in the Base Year (1997)

Name of Municipality	Type	No. of PU with Toilets in 1997	No. of PU with Sanitary Toilets in 1997	No. of PU with Toilets in Planned/On-going Project	No. of PU with Sanitary Toilets in Planned/On-going Projects	No. of PU with Toilets in Base Year 1997	No. of PU with Sanitary Toilets in Base year 1997	Coverage (%)
Baganga	Public Market	2	1			2	1	50
	Bus/Jeepney Terminal	2	1			2	1	50
	Parks/Playground	2	1			2	1	50
	Total	6	3			6	3	50
Banaybanay	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	2	1			2	1	50
	Parks/Playground	1	1			1	1	100
	Total	4	3			4	3	75
Boston	Public Market	2	1			2	1	50
	Bus/Jeepney Terminal	1				1		
	Parks/Playground	1				1		
	Total	4	1			4	1	25
Caraga	Public Market	2	1			2	1	50
	Bus/Jeepney Terminal	1				1		
	Parks/Playground	1				1		
	Total	4	1			4	1	25
Cateel	Public Market	1				1		
	Bus/Jeepney Terminal	1				1		
	Parks/Playground	2	1			2	1	50
	Total	4	1			4	1	25
Governor Generoso	Public Market	1				1		
	Bus/Jeepney Terminal	1				1		
	Parks/Playground	1	1			1	1	100
	Total	3	1			3	1	33
Lupon	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	1				1		
	Parks/Playground	1	1			1	1	100
	Total	3	2			3	2	67
Manay	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	1				1		
	Parks/Playground	1	1			1	1	100
	Total	3	2			3	2	67
Mati (Capital)	Public Market	2	1			2	1	50
	Bus/Jeepney Terminal	1	1			1	1	100
	Parks/Playground	3	3			3	3	100
	Total	6	5			6	5	83
San Isidro	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal	2	1			2	1	50
	Parks/Playground	1	1			1	1	100
	Total	4	3			4	3	75
Tarragona	Public Market	1	1			1	1	100
	Bus/Jeepney Terminal							
	Parks/Playground							
	Total	1	1			1	1	100
Provincial Total	Public Market	15	9			15	9	60
	Bus/Jeepney Terminal	13	4			13	4	31
	Parks/Playground	14	10			14	10	71
	Total	42	23			42	23	55

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			No. of HHs	Percentage of Served Households				
							Flush	Pour Flush	VIP/Dry		Flush	Pour Flush	VIP/Dry		Flush	Pour Flush	VIP/Dry		
Baganga	Urban	158	1,510		1,668	2,533	6	60		66	9,095	66	2,814	6	54		59	10,024	59
	Rural		4,296	5	4,301	5,242	82	82		82	11,300	82	5,825	74	74		74	24,968	74
	Total	158	5,806	5	5,969	7,775	2	75	77	77	20,395	77	8,639	2	67	69	69	34,992	69
Bantayan	Urban	350	1,190		1,540	2,061	17	58	75	75	8,284	75	2,324	15	51		66	9,264	66
	Rural		3,107	5	3,112	4,291	72	72		73	8,063	73	4,841	64	64		64	19,022	64
	Total	350	4,297	5	4,652	6,352	6	68	73	73	16,347	73	7,165	5	60	65	65	28,286	65
Boston	Urban	34	387		421	457	7	85	92	92	2,254	92	507	7	76		83	2,501	83
	Rural		871	5	876	1,440	60	60		61	1,495	61	1,597	55	55		55	5,638	55
	Total	34	1,258	5	1,297	1,897	2	66	68	68	3,749	68	2,104	2	60	62	62	8,139	62
Caraga	Urban	127	535		662	1,044	12	51	63	63	3,408	63	1,158	11	46		57	3,789	57
	Rural		4,679	5	4,684	5,170	91	91		91	4,923	91	5,734	82	82		82	27,500	82
	Total	127	5,214	5	5,346	6,214	2	84	86	86	8,331	86	6,892	2	76	78	78	31,289	78
Cateel	Urban	95	756		851	1,071	9	71	79	79	4,527	79	1,182	8	64		72	5,023	72
	Rural		3,016	5	3,021	4,198	72	72		72	4,126	72	4,635	65	65		65	17,709	65
	Total	95	3,772	5	3,872	5,269	2	72	73	73	8,653	73	5,817	2	65	67	67	22,732	67
Governor Generoso	Urban	107	1,212		1,319	1,868	6	65	71	71	6,991	71	2,054	5	59		64	7,605	64
	Rural		4,567	5	4,572	6,250	73	73		73	7,188	73	6,870	66	66		66	26,584	67
	Total	107	5,779	5	5,891	8,118	1	71	73	73	14,179	73	8,924	1	65	66	66	34,189	66
Lupon	Urban	371	1,110		1,481	3,424	11	32	43	43	7,863	43	3,803	10	29		39	8,788	39
	Rural		6,194	5	6,199	6,556	94	94		95	17,371	95	7,282	85	85		85	35,780	85
	Total	371	7,304	5	7,680	9,980	4	73	77	77	25,234	77	11,085	3	66	69	69	44,568	69
Manay	Urban	238	703		941	1,313	16	46	62	62	5,011	62	1,683	14	42		56	5,590	56
	Rural		3,925	5	3,930	5,532	71	71		71	5,738	71	6,133	64	64		64	22,613	64
	Total	238	4,628	5	4,871	7,045	3	66	69	69	10,749	69	7,836	3	59	62	62	28,203	62
Mati (Capital)	Urban	2,606	2,002		4,608	8,551	30	23	54	54	23,597	54	9,293	28	22		50	25,776	50
	Rural		5,317	7	5,324	10,158	52	52		52	22,723	52	11,040	48	48		48	29,797	48
	Total	2,606	7,319	7	9,932	18,709	14	39	53	53	46,320	53	20,333	13	36	49	49	55,573	49
San Isidro	Urban	227	971		1,198	1,805	13	54	66	66	6,242	66	1,997	11	49		60	6,940	60
	Rural		3,751	5	3,756	4,967	92	92		92	8,701	92	4,500	83	83		83	22,665	83
	Total	227	4,722	5	4,954	5,872	4	80	84	84	14,943	84	6,497	3	73	76	76	29,105	76
Tarragona	Urban	65	372		437	893	7	42	49	49	2,258	49	1,010	6	37		43	2,531	43
	Rural		2,382	5	2,387	3,059	78	78		78	3,459	78	3,459	69	69		69	14,097	69
	Total	65	2,754	5	2,824	3,952	2	70	71	71	5,852	71	4,469	1	62	63	63	16,628	63
Provincial Total	Urban	4,378	10,748		15,126	25,220	17	43	60	60	79,550	60	27,825	16	39		54	87,331	54
	Rural		42,105	57	42,162	55,963	75	75	75	95,222	75	61,936	68	68		68		245,873	68
	Total	4,378	52,853	57	57,288	81,183	5	65	71	71	174,752	71	89,761	5	59	64	64	333,704	64

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 1997		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	%							
Baganga	3,280	10,256	32	11,331	29	6	3	50	9	3	33.33	
Banaybanay	7,766	7,766	100	8,746	89	4	3	75	4	3	75	
Boston	480	3,407	14	3,787	13	4	1	25	6	1	17	
Caraga	3,040	8,990	34	10,005	30	4	1	25	5	1	20	
Cateel	3,560	7,517	47	8,282	43	4	1	25	5	1	20	
Governor Generoso	3,640	11,213	32	12,306	30	3	1	33	3	1	33	
Lupon	7,120	12,856	55	14,262	50	3	2	67	6	2	33	
Manay	4,040	8,416	48	9,314	43	3	2	67	3	2	67	
Mati (Capital)	16,320	25,123	65	27,247	60	6	5	83	10	5	50	
San Isidro	5,840	7,696	76	8,543	68	4	3	75	4	3	75	
Tarragona	2,120	4,293	49	4,858	44	1	1	100	4	1	25	
Provincial Total	57,206	107,533	53	118,681	48	42	23	55	59	23	39	

8.3 Projection of Frame Values

8.3.1 Review of Past Population Development and Population Projection

(1) Review of past population development

1) Characteristics of past population development

Major statistical data of past population development are shown in Table 8.3.1 in which urban and rural population are adjusted by PPDO to reflect present conditions.

Table 8.3.1 Past Population Development

Area	Description	Total			Urban			Rural		
		1980	1990	1995	1980	1990	1995	1980	1990	1995
Region-XI	Population	3,346,803	4,458,829	5,052,730	1,133,338	2,108,693	1,782,376	2,213,465	2,350,136	3,270,354
	Growth Rate	2.91%		2.53%	6.41%		-3.31%	0.60%		6.83%
Davao Oriental	Population	339,931	394,697	413,472	76,582	151,808	121,858	263,349	242,839	291,614
	Growth Rate	1.50%		0.93%	7.08%		-4.30%	-0.81%		3.72%
	Percentage 1/	10.2%	8.9%	8.2%	6.8%	7.2%	6.8%	11.9%	10.3%	8.9%

Note: 1/ Provincial population percentage to regional population

During the census year from 1980 to 1990 and from 1990 to 1995 which was the latest census year, the following population development was observed:

- The province recorded an average annual growth rate 1.50% of (1980-1990) and 0.93% (1990-1995) which were almost half as that of the region at 2.91% and 2.53% respectively.
- Percentage of provincial population to the regional population decreased from 10.2% in 1980 to 8.2% in 1995 which was affected by lower growth compared with the regional growth rates.

2) 1995 population distribution in urban and rural areas

The 1995 population census results conducted by NSO were reviewed in terms of population distribution to urban and rural areas. Applying the revised classification of barangays in urban and rural category to reflect present conditions, the population by municipality was adjusted as shown in Table 8.3.2.

Table 8.3.2 Population Distribution in Urban and Rural Areas

Municipality	Total Population	1995 Census Data		Adjusted Population	
		Urban	Rural	Urban	Rural
Baganga	39,750	13,313	26,437	13,313	26,437
Banaybanay	33,082	10,612	22,470	10,612	22,470
Boston	10,424	2,368	8,056	2,368	8,056
Caraga	31,617	5,230	26,387	5,230	26,387
Cateel	27,211	5,548	21,663	5,548	21,663
Governor Generoso	41,433	9,549	31,884	9,549	31,884
Lupon	50,668	15,538	35,130	17,666	33,002
Manay	35,428	7,805	27,623	7,805	27,623
Mati (Capital)	93,801	42,556	51,245	42,556	51,245
San Isidro	30,279	6,758	23,521	9,151	21,128
Tarragona	19,779	2,581	17,198	4,423	15,356
Provincial Total	413,472	121,858	291,614	128,221	285,251

(2) Manner of population projection

The latest population study, National and Regional Population Projections was issued by NSO based on 1995 census results including the growth rates and demographic conditions of the respective regions. However, during this PW4SP preparation, the provincial/municipal population has not yet been published. It appears that there is already a long delay since the conduct of the 1995 Population Census. Meanwhile, the NSO's possible method to be applied for provincial and municipal population projection was confirmed.

As a local based projection, the Study on the Davao Integrated Development Program (DIDP) Master Planning is currently being implemented under the technical cooperation of JICA, however, the population projection has not been completed yet. In this respect, the possible method of NSO was adopted for this PW4SP. The regional population projected by the NSO was employed for this planning. The following are the manner of projection with conditions/assumptions employed for provincial and municipal population in the future.

- 1) Population projections for the provinces are first generated based on population projections for the Region XI taken from a published volume on regional population projection for the years 1995 to 2020. The regional population is projected based on the 1995 Census of Population

- 2) The ratio method is used for the projection of both provincial and municipal population.
- For the provincial level projections, ratios (R) of the population of the concerned provinces to the population of the region are projected. These ratios are multiplied to the projected population of the region for each projection year.
 - Similarly, for the municipal population projections, ratios of the population of the municipalities of each concerned province to the population of the province are projected. These ratios are multiplied to the projected population of the province for each projection year.
 - The basic assumption adopted is that for each concerned province, and for each of the municipality in the province, the rate (r) at which the ratios change will gradually decline so that they will all become zero after 50 years from 1995. This implies that stability of the ratios will be attained after 50 years from 1995.
 - Based on this assumption, a schedule of ratios of the provinces in the same region, and of the municipalities in the same province is derived for each projection year using the formula:

$$R(k) = R(0) \prod_{i=1}^k (1 + r - kr / 50)$$

where; R(k) = ratio in kth year from 1995 of the population of the province to that of the region or of the population of the municipality to that of the province

R(0) = ratio in 1995 of the population of the province to that of the region or of the population of the municipality to that of the province

r = initial rate of change of the ratio

k = "k"th year from 1995

- The initial rate of change is derived based on the levels and trends of the ratios observed in the 1970, 1980 and 1995 censuses.
- A geometric formula for calculating the rate at which the ratio changes is adopted, that is, r is equal to $(\ln(P_2/P_1))/n$, where P_2 is the ratio in Year₂, P_1 , in Year₁, and n is the number of years between Year₁ and Year₂. Thus for instance, for the intercensal period 1970-1980, the rate of change in the ratio is equal to $\ln(P_{1980}/P_{1970})$.

3) In the present application (r), the concerned provinces and municipalities are classified into the following four types based on the trends of their ratios as observed in the censuses of 1970, 1980, 1990 and 1995:

- Type I -- provinces/municipalities that showed unidirectional trend in their ratios, that is, consistently increasing or decreasing from 1970 to 1995 (r is positive or negative for intercensal periods 1970-1980, 1980-1990 and 1990-1995);
- Type II -- provinces/municipalities that showed unidirectional trend in their ratios only from 1980 to 1995 (r is positive or negative for the last two intercensal periods only, that is, 1980-1990 and 1990-1995);
- Type III -- provinces/municipalities that showed unidirectional trend in their ratios only from 1970 to 1990 (r is positive or negative for the first two intercensal periods only, that is 1970-1980 and 1980-1990);
- Type IV -- provinces/municipalities with erratic trends.

In general, the initial rate to be used for each type of province or municipality is determined according to the following criteria.

- For a type I province or municipality, the initial rate is equal to the lowest observed annual rate change in the ratio or the lower of the average annual rates observed during the 1980-1990 and 1990-1995 periods, whichever produces a more demographically probable result;
- For a type II province or municipality, the initial rate is equal to the lower of the average annual rates observed during 1980-1990 and 1990-1995 periods;
- For a type III province or municipality, the initial rate is equal to one-half of the average annual rate during the period 1990-1995; and
- For type IV province or municipality, the initial rate is equal to one-half of the average annual rate during the period 1990-1995, or it is equal to zero if the ratio in 1995 is equal to or higher than 0.20. An initial rate of zero means that the ratio observed in 1995 would remain the same throughout the projection period.

The province of Davao Oriental is classified as "Type I" based on the past level and trend of ratios of change, and initial rate of change was estimated at -0.0104. While, those of the municipalities were established as shown below.

<u>Municipalities</u>	<u>Initial Ratio</u>	<u>Municipalities</u>	<u>Initial Ratio</u>
Bagang	0.00043	Lupon	0.00041
Banaybanay	0.00180	Manay	0.00052
Boston	0.00032	Mati (Capital)	-0.00158
Caraga	0.000228	San Isidro	0.00063
Cateel	-0.00013	Tarragona	0.02019
Governor Generoso	-0.00054		

(3) Present population (1997)

The present population of the province including municipalities was estimated in application of the initial rates of change as mentioned above. This means that the trend of past population development is assumed to have been prevailing up to the present. Household size in 1997 was also assumed to be the same as that in 1995.

(4) Projection of provincial population by target year

Review of provincial population projected by target year applying aforementioned method, as shown in Table 8.3.3, revealed that the future provincial population also reflected the discounted growth rate, which is the same as the regional population projection.

- Population in 2003 was derived using the average annual growth rate of 1.70 % (1995-1998) and 1.67 % (1998-2003).
- Population in 2010 with 2003 as base year was derived using an average annual growth rate of 1.43% (2003-2010).
- The present profile of municipal population distribution both in urban and rural areas is assumed to prevail through the future.
- Household size in the year 2003 is assumed to be the same as the 1995 population census results, while that in the year 2010, 4 persons/household is assumed for the whole province in accordance with the target of the national family planning.

Table 8.3.3 Growth Rates and Population Projection for Target Years: Region and Province

Area	Growth Rate (%)					Population and Provincial Share in the Region			
	1980 - 1990	1990 - 1995	1995 - 1998	1998 - 2003	2003 - 2010	Past Year		Target Year	
						1995	1997	2003	2010
						NSO Census	Planning Base Year	Medium Term	Long Term
Region XI	2.91	2.53 (13.1)	2.69 6.3	2.45 (8.9)	2.11 (13.9)	5,052,730	5,331,644	6,173,575	7,146,889
Davao Oriental	1.50	0.93	1.70	1.67	1.43	413,472 8.2%	427,242 8.0%	472,434 7.7%	521,874 7.3%

Note: () shows percentage of growth rate decline from the previous period.

Table 8.3.4 shows the provincial population by urban and rural area for the target years, and the years 1995 and 1997. The profile of urban and rural population in 1995 is adopted for the projection of the same composition in the base year and target years. Table 8.3.5 presents the projected number of households for the target years.

Table 8.3.4 Provincial Population for Target Years

Area	Population/ Composition	1995	1997	2003	2010
Total	Population	413,472	427,242	472,434	521,874
Urban Area	Population	128,221	132,393	146,098	161,065
	Composition (%)	31			
Rural Area	Population	285,251	294,849	326,336	360,809
	Composition (%)	69			

Table 8.3.5 Projected Number of Households by Urban and Rural Area by Municipality by Target Year

Name of Municipality	Number of Households														
	Household Size			1995			1997			2003			2010		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Baganga	5.44	5.22	5.29	2,447	5,063	7,510	2,533	5,242	7,775	2,814	5,825	8,639	4,248	8,435	12,683
Banaybanay	5.36	5.45	5.42	1,980	4,122	6,102	2,061	4,291	6,352	2,324	4,841	7,165	3,509	7,431	10,940
Boston	5.36	5.79	5.69	442	1,391	1,833	457	1,440	1,897	507	1,597	2,104	753	2,563	3,316
Caraga	5.18	5.28	5.27	1,009	4,993	6,002	1,044	5,170	6,214	1,158	5,734	6,892	1,662	8,384	10,046
Cateel	5.35	5.33	5.33	1,037	4,064	5,101	1,071	4,198	5,269	1,182	4,635	5,817	1,744	6,811	8,555
Governor Generoso	5.27	5.26	5.27	1,813	6,056	7,869	1,868	6,250	8,118	2,054	6,870	8,924	2,971	9,920	12,891
Lupon	5.34	5.21	5.26	3,311	6,329	9,640	3,424	6,556	9,980	3,803	7,282	11,085	5,633	10,524	16,157
Manay	5.34	5.17	5.21	1,461	5,338	6,799	1,513	5,532	7,045	1,683	6,153	7,836	2,496	8,833	11,329
Mani (Capital)	5.11	5.18	5.15	8,332	9,896	18,228	8,551	10,158	18,709	9,293	11,040	20,333	12,888	15,519	28,407
San Isidro	5.24	5.37	5.33	1,747	3,931	5,678	1,805	4,067	5,872	1,997	4,500	6,497	2,892	6,676	9,568
Tarragona	5.16	5.23	5.22	857	2,934	3,791	893	3,059	3,952	1,010	3,459	4,469	1,471	5,108	6,579
Provincial Total	5.25	5.27	5.26	24,436	54,117	78,553	25,220	55,963	81,183	27,825	61,936	89,761	40,267	90,204	130,471

8.3.2 School Enrollment Projection

Table 8.3.6 Projected School Enrollment by Municipality by Target Year

Name of Municipality	1997						2003						2010					
	School Age Population		Total Enrollment		Public Sch. Enrollment		School Age Population		Total Enrollment		Public Sch. Enrollment		School Age Population		Total Enrollment		Public Sch. Enrollment	
	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate
Baganga	11,723	93	10,921	87	10,256	87	13,024	93	12,112	87	11,331	87	14,453	95	13,750	95	13,008	90
Banaybanay	9,691	81	7,820	80	7,766	80	10,932	81	8,855	80	8,746	80	12,316	85	10,469	85	9,853	80
Boston	2,892	118	3,407	118	3,407	118	3,269	118	3,787	118	3,787	118	3,557	100	3,557	100	3,557	100
Caraga	9,805	96	9,389	92	8,990	92	10,875	96	10,440	92	10,005	92	12,047	98	11,806	98	11,445	95
Cateel	7,980	98	7,858	94	7,317	94	8,811	98	8,635	94	8,282	94	9,717	98	9,523	98	9,231	95
Governor Generoso	12,579	90	11,360	89	11,213	89	13,827	90	12,444	89	12,306	89	15,182	95	14,423	95	14,271	94
Lupon	14,591	92	13,388	88	12,856	88	16,207	92	14,910	88	14,262	88	17,981	95	17,082	95	16,902	94
Manay	10,602	83	8,770	79	8,416	79	11,790	83	9,786	79	9,314	79	13,096	85	11,132	85	10,477	80
Mani (Capital)	26,392	111	29,353	95	25,123	95	28,681	111	31,836	95	27,247	95	31,135	100	31,135	100	29,578	95
San Isidro	8,579	91	7,849	90	7,696	90	9,492	91	8,638	90	8,543	90	10,491	95	9,966	95	9,862	94
Tarragona	5,728	75	4,293	75	4,293	75	6,477	75	4,858	75	4,858	75	7,315	100	7,315	100	7,315	100
Provincial Total	120,562	95	114,408	89	107,533	89	133,325	95	126,301	89	118,681	89	147,290	95	140,138	95	135,499	92

8.3.3 Projection of the Number of Public Utilities

Table 8.3.7 Projected Number of Public Utilities by Municipality by Target Year

Name of Municipality	Type	1997	2003		2010	
		No. of Public Utilities	Proposed Construction	Total	Proposed Construction	Total
Baganga	Public Market	2	1	3	2	5
	Bus/Jeepney Terminal	2	1	3	2	5
	Parks/Playground	2	1	3	4	7
	Total	6	3	9	8	17
Banaybanay	Public Market	1		1	1	2
	Bus/Jeepney Terminal	2		2		2
	Parks/Playground	1		1	5	6
	Total	4		4	6	10
Boston	Public Market	2		2	1	3
	Bus/Jeepney Terminal	1	1	2	1	3
	Parks/Playground	1	1	2	3	5
	Total	4	2	6	5	11
Caraga	Public Market	2		2	1	3
	Bus/Jeepney Terminal	1	1	2		2
	Parks/Playground	1		1	4	5
	Total	4	1	5	5	10
Cateel	Public Market	1		1	1	2
	Bus/Jeepney Terminal	1	1	2		2
	Parks/Playground	2		2	5	7
	Total	4	1	5	6	11
Governor Generoso	Public Market	1		1	1	2
	Bus/Jeepney Terminal	1		1	1	2
	Parks/Playground	1		1	4	5
	Total	3		3	6	9
Lupon	Public Market	1	1	2	1	3
	Bus/Jeepney Terminal	1	1	2		2
	Parks/Playground	1	1	2	5	7
	Total	3	3	6	6	12
Manay	Public Market	1		1	1	2
	Bus/Jeepney Terminal	1		1	1	2
	Parks/Playground	1		1	2	3
	Total	3		3	4	7
Mati (Capital)	Public Market	2	1	3	2	5
	Bus/Jeepney Terminal	1	1	2	1	3
	Parks/Playground	3	2	5	8	13
	Total	6	4	10	11	21
San Isidro	Public Market	1		1	1	2
	Bus/Jeepney Terminal	2		2	1	3
	Parks/Playground	1		1	4	5
	Total	4		4	6	10
Tarragona	Public Market	1	1	2		2
	Bus/Jeepney Terminal		1	1		1
	Parks/Playground		1	1	2	3
	Total	1	3	4	2	6
Provincial Total	Public Market	15	4	19	12	31
	Bus/Jeepney Terminal	13	7	20	7	27
	Parks/Playground	14	6	20	46	66
	Total	42	17	59	65	124

8.4 Types of Facilities and Implementation Criteria

8.4.1 Water Supply

(1) Urban water supply

1) Untapped spring

First priority is given to seek for utilization of untapped spring with large discharge capacity. During the course of PW4SP preparation, various untapped spring sources have been identified. Considerably large scale untapped spring sources having discharge capacity of more than 100 cu.m/day are then selected as potential water sources and rapidly evaluated as shown in Table 8.4.1.

Table 8.4.1 Rapid Evaluation of Untapped Spring for Use in Urban Water Supply

Name of Municipality	Untapped Spring					Population can be Served by Untapped Spring	Population Served by Existing Water Supply System/Facility In Base Year		Future Urban Population	
	Location (Name of Barangay)	Discharge Capacity (cu.m/day)		Elev. Diffr. (m)	Dist. from Mun. (km)		Level III	Total	2003	2010
		100%	70%							
Boston	Simylao	240	170	98	0.5	1,700	0	782	2,719	3,013
Cateel	Abijod	3,270	2,290	3	5.0	22,900	0	2,330	6,326	6,977
	Mainit	14,400	10,000	3	0.5	100,000				
		14,400	10,000	Unknown	0.4	100,000				
	Sub-total	32,070	22,290			222,900				
Governor Generoso	Oregon	240	170	200	2.0	1,700	1,477	6,124	10,823	11,833
Lupon	Don Mariano	650	460	20	1.0	4,600	2,825	14,671	20,310	22,533
		650	460	20	2.0	4,600				
		650	460	20	0.5	4,600				
		650	460	40	1.0	4,600				
		980	690	20	1.0	6,900				
		980	690	30	1.5	6,900				
	Sub-total	4,560	3,220			32,200				
Mati	Don Salvador	5,450	3,800	180	3.0	38,000	14,528	31,317	47,488	51,551

Eleven (11) untapped spring sources in five municipalities were selected as potential water source for urban water supply and evaluated as shown below based on the information gathered at this moment.

Boston

Boston has one untapped spring with discounted discharge amount of approximately 170 cu.m/day which is equivalent to about 1,700 persons of service coverage. This spring source is reported to have an elevation of about 100m and about 500m distance from the poblacion.

At present, the municipality is not served by Level III system, while its urban population is estimated to increase to about 2,700 persons in Phase I period.

When water demand and the discounted discharge amount is compared, the said untapped spring is quite suitable to establish a Level III system.

Cateel

The municipality has a total of three (3) untapped spring sources with a combined discounted discharge of some 22,290 cu.m/day or equivalent to serve some 222,900 persons. Although these untapped springs are reported to be within 5 km distance from poblacion, their elevation and topography are marginally small at 3 m (elevation of one spring is unknown).

Currently, Cateel is not served by Level III system and about 2,300 persons are depending on Level II system and/or Level I facilities. The future urban population is estimated to reach to about 6,300 persons during Phase I period and 7,000 persons by the end of Phase II. In this regard, the said untapped spring source has a supply capacity of more than the anticipated water demand of the municipality. Therefore, an inter-municipal water supply will be an option for an effective utilization of this potential water source, if technical and financial feasibility is confirmed.

Governor Generoso

One untapped spring was identified during the PW4SP preparation having a discounted discharge of about 170 cu.m/day.

Approximately 1,500 persons in the urban area are currently served by Level III system and the urban population is expected to increase up to some 10,800 persons during Phase I period. The increasing water demand is far beyond the discharge capacity of the said untapped spring. In this regard, there will be two options for utilization of this spring: (1) to utilize a part of the new water source for augmentation of Level III system; and (2) to utilize as a water source for Level II system in Barangay Oregon where the spring is located. In either case, reliable/dependable discharge throughout the year, elevation, distance from potential service area as well as topographic conditions are subject to site confirmation prior to feasibility study and detailed design.

Lupon

There are 6 untapped springs and all of these are located in Barangay Don Mariano. The combined amount of discounted discharge reaches as high as 3,220 cu.m/day or equivalent to cater for some 32,200 persons. Presently, the WD is serving for some 2,800 persons by Level III system and another 14,700 persons are depending on Level II system and/or Level I facilities. Since the municipality is planned to have service coverage of water supply to some 20,300 persons during Phase I period, an additional water source is indeed indispensable for an expansion of WD. In this respect, the said untapped spring may be given first priority for development, provided however, the reported elevation (20 m to 40 m), topographic conditions and distance are subject to site confirmation during the feasibility study and detailed design.

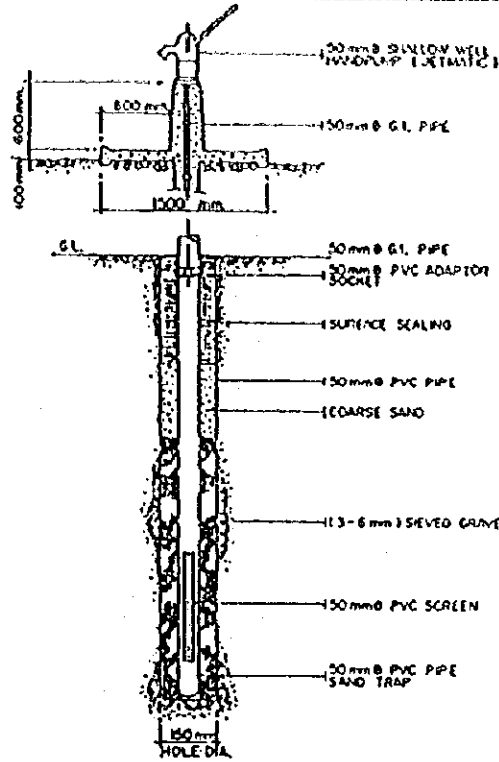
In addition to the above, the excess volume of spring discharge beyond the water demand of the municipality may be utilized to expand service area to rural barangays and furthermore, to cater for neighboring municipalities, if it is confirmed feasible.

Mati

This particular municipality has quite a large scale untapped spring with discounted discharge capacity of about 3,800 cu.m/day which is equivalent to serve for some 38,000 persons by Level III system.

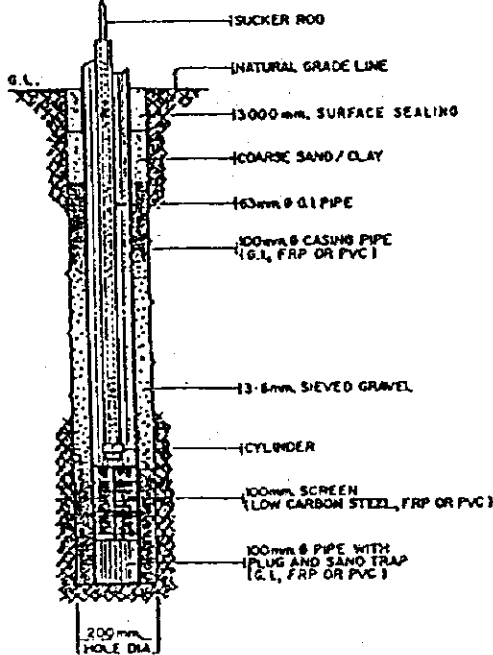
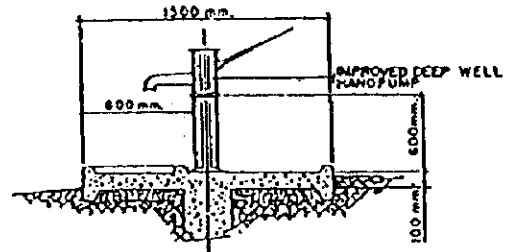
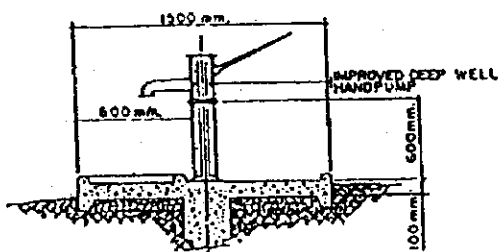
Some 14,500 persons are currently served by the WD and another 31,300 persons are depending on Level II system and/or Level I facilities. The urban population is estimated to increase to as high as 47,500 persons during Phase I period. In this respect, the said untapped spring is deemed a very useful water source for expansion of the existing Level III system. Any excess water beyond the water demand can be utilized to cover rural barangays and furthermore, to cater for neighboring municipality, if technical and financial feasibility is confirmed.

As evaluated on the above, the municipalities of Boston, Cateel, Mati and Lupon have favorable untapped spring sources for Level III system. Specifically, Cateel and Lupon have excess volume of spring discharge beyond their water demand in the municipality and are capable to serve not only in rural barangays, but also for their neighboring municipality. It shall be noted, however, that confirmation of difference of elevation between untapped spring and potential service area, as well as distance and topographic conditions is prerequisite to realize this option. Discharge measurement of each spring throughout the year is also indispensable to obtain dependable/reliable discharge of the springs.

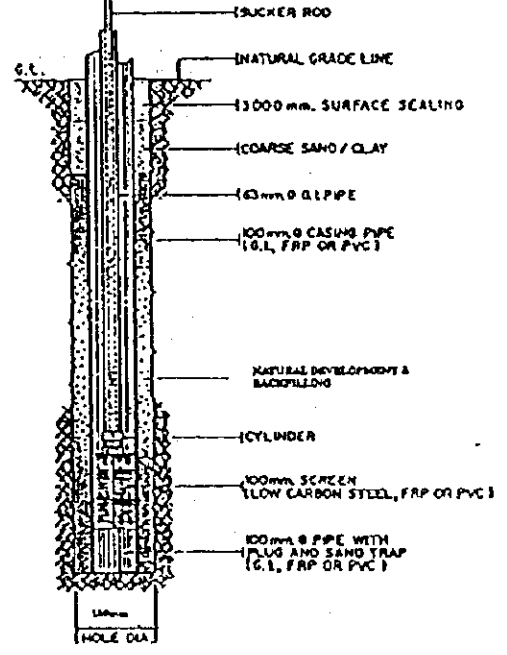


OPEN HOLE DRILLING & GRAVEL PACK METHOD

SHALLOW WELLS



OPEN HOLE DRILLING & GRAVEL PACK METHOD



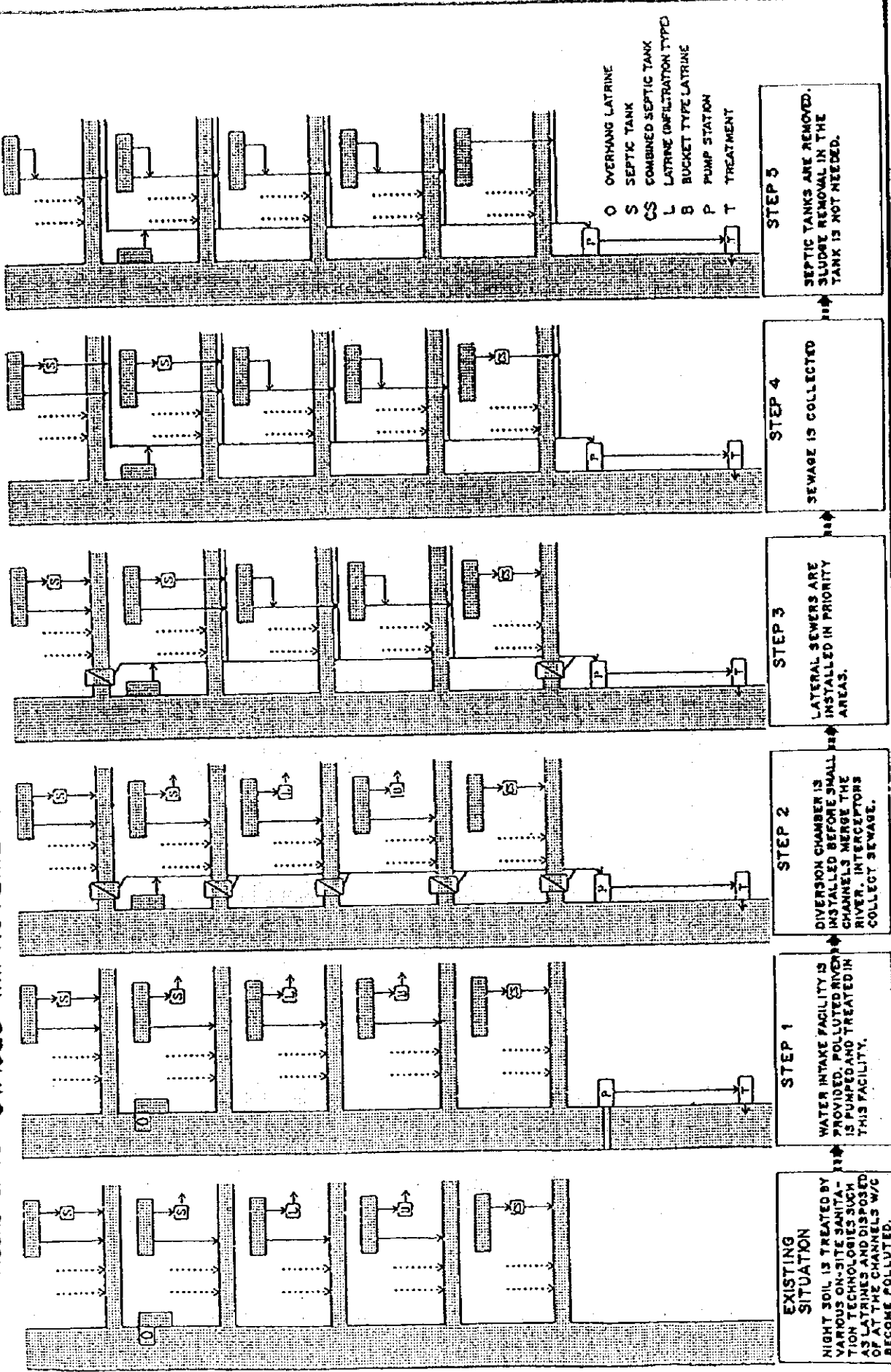
OPEN HOLE DRILLING & NATURAL GRAVEL PACK METHOD

DEEP WELLS

FIGURE 8.4.1

TYPICAL STRUCTURE OF LEVEL I WELL FACILITY

FIGURE 8.4.2 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

Forty nine (49) untapped spring sources were confirmed to be suitable for Level II systems in rural water supply by the time of PW4SP preparation as shown in Table 8.5.1. Conditions and assumptions applied for this estimate are as follows:

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

Name of Municipality	Number of Untapped Spring	Number of Barangay to be Served	Number of Households to be Served	Population to be Served
Baganga				
Banaybanay				
Boston	3	3	300	1,737
Caraga				
Catecl	8	8	800	4,264
Governor Generoso	14	14	1,400	7,364
Lupon	6	6	600	3,126
Manay				
Mati (Capital)	9	9	900	4,662
San Isidro	9	9	900	4,833
Tarragona				
Provincial Total	49	49	4,900	25,986

Source capacity:

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

Number of system:

Forty nine (49) untapped springs were considered to serve forty nine (49) Level II systems in forty nine (49) rural barangays of six(6) municipalities.

(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 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 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 through the future.

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

Table 8.S.2 Population to be Served in Phase I (Water Supply)

Name of Municipality	Area	Population Served in the Base Year				Phase I Coverage (2003)									
		Level III			Total	Service Coverage			Additional Population to be Served			Total			
		Level III	Level II	Level I		Level III	Level II	Level I	Level III	Level II	Level I				
Baganga	Urban	2,280	446	3,540	6,266	15,310	6,731	446	3,540	10,717	4,451				4,451
	Rural		3,882	5,514	9,396	30,404	6,731	3,882	14,360	18,242				8,846	8,846
	Total	2,280	4,328	9,054	15,662	45,714	6,731	4,328	17,900	28,959	4,451			8,846	13,297
Banaybanay	Urban		9,456	9,456		12,459		9,456	9,456						
	Rural	1,324	4,144	11,909	17,377	26,382	1,324	4,144	11,909	17,377					
	Total	1,324	4,144	21,365	26,833	38,841	1,324	4,144	21,365	26,833					
Boston	Urban		782	782		2,719		782	782		1,121				1,121
	Rural		2,650	322	2,972	9,248		4,387	1,162	5,549		1,737		840	2,577
	Total		2,650	1,104	3,754	11,967	6,000	3,548	652	4,200		1,527		840	1,527
Caraga	Urban	2,021	652	6,395	9,784	30,274	1,849	1,540	14,775	18,164				8,380	8,380
	Rural	1,849	1,540	6,395	12,457	36,274	5,397	2,192	14,775	22,364	1,527			8,380	9,907
	Total	3,870	2,192	2,330	2,330	6,326	2,098	6,773	8,049	14,822	2,098			806	2,098
Cateel	Urban		2,509	7,243	9,752	24,703		6,773	10,379	19,250		2,098		4,264	5,070
	Rural		2,509	9,573	12,082	31,029	2,098	6,773	10,379	19,250	2,098		4,264	806	7,168
	Total	1,477		4,647	6,124	10,823	2,929	4,647	6,203	21,682	1,452		7,364	7,364	
Governor Generoso	Urban		8,115	9,293	17,408	36,137		15,479	6,203	21,682					
	Rural		8,115	13,940	23,532	46,960	2,929	15,479	10,850	29,258	1,452				
	Total	1,477	2,825	11,025	14,671	20,310	2,825	821	11,025	14,671					
Lupon	Urban	129	2,488	21,662	24,279	37,941	129	5,614	21,662	24,279			3,126		3,126
	Rural	2,954	3,309	32,687	38,950	58,251	2,954	6,435	32,687	38,950			3,126		3,126
	Total	1,500	800	2,500	2,500	8,988	5,492	800	6,292	6,292	3,992				3,992
Manay	Urban		351	1,358	1,709	31,809			18,734	19,085				17,376	17,376
	Rural		1,151	1,358	4,009	40,797	5,492	1,151	18,734	25,377	3,992			17,376	21,368
	Total	14,528	162	16,627	31,317	47,488	16,453	162	16,627	33,242	1,925				1,925
Man (Capital)	Urban	3,049	19,495	5,322	27,866	57,185	3,049	24,157	7,105	34,311			4,662	1,783	6,445
	Rural	17,577	19,657	21,949	59,183	104,673	19,502	24,319	23,732	67,553	1,925		4,662	1,783	8,370
	Total	2,160	800	2,805	5,765	10,465	3,721	800	2,805	7,326	1,561				1,561
San Isidro	Urban	160	3,991	7,414	11,565	24,163	160	8,824	5,514	14,498			4,833		4,833
	Rural	2,320	4,791	10,219	17,330	34,628	3,881	9,624	8,319	21,824	1,561		4,833		6,394
	Total		1,500	38	1,538	5,210	2,109	1,500	38	3,647	2,109				2,109
Tarragona	Urban		3,005	1,996	5,001	18,090		3,005	7,849	10,854				5,853	5,853
	Rural		4,505	2,034	6,539	23,300	2,109	4,505	7,887	14,501	2,109			5,853	7,962
	Total	26,791	5,181	51,250	83,222	146,098	47,027	5,181	51,250	103,438	20,236			25,986	43,884
Provincial Total	Urban	6,511	52,170	78,428	137,109	326,336	6,511	78,156	117,322	198,863			25,986	43,884	69,870
	Rural	33,302	57,351	129,678	220,331	472,434	53,538	83,337	168,572	302,321	20,236			25,986	43,884
	Total														90,106

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			Total	Service Coverage			Additional Population to be Served									
		Level III	Level II	Level I		Level III	Level II	Level I	Total	Level III	Level II	Level I	Total					
Baganga	Urban	6,731	446	3,540	10,717	16,990	16,141	16,141	16,141	3,882	27,496	31,378	16,141	9,410	9,410	9,410	9,410	
	Rural		3,882	14,360	18,242	33,740				3,882	27,496	47,519	31,378	9,410	13,136	13,136	13,136	13,136
	Total	6,731	4,328	17,900	28,959	50,730	16,141	16,141	16,141	3,882	27,496	47,519	31,378	9,410	13,136	13,136	13,136	13,136
Banaybanay	Urban			9,456	9,456	14,037	13,335	13,335	14,037	4,144	22,173	27,641	13,335	13,335	13,335	13,335	13,335	13,335
	Rural	1,324	4,144	11,909	17,377	29,722	1,324	1,324	11,909	4,144	22,173	27,641	13,335	13,335	13,335	13,335	13,335	13,335
	Total	1,324	4,144	21,365	26,833	43,759	1,324	1,324	11,909	4,144	22,173	27,641	13,335	13,335	13,335	13,335	13,335	13,335
Boston	Urban	1,121		782	1,903	3,013	2,862	2,862	3,013	4,387	5,146	9,533	2,862	1,741	1,741	1,741	1,741	1,741
	Rural		4,387	1,162	5,549	10,250				4,387	5,146	9,533	2,862	1,741	1,741	1,741	1,741	1,741
	Total	1,121	4,387	1,944	7,452	13,263	2,862	2,862	3,013	4,387	5,146	9,533	2,862	1,741	1,741	1,741	1,741	1,741
Caraga	Urban	3,548	652	4,200	4,200	6,647	6,315	6,315	6,647	1,540	27,799	31,188	6,315	2,767	2,767	2,767	2,767	2,767
	Rural	1,849	1,540	14,775	18,164	33,536	1,849	1,849	14,775	1,540	27,799	31,188	1,849	13,024	13,024	13,024	13,024	13,024
	Total	5,397	2,192	14,775	22,364	40,183	8,164	8,164	14,775	1,540	27,799	37,503	8,164	2,767	2,767	2,767	2,767	2,767
Cateel	Urban	2,098		2,330	4,428	6,977	6,628	6,628	6,977	6,773	18,564	25,337	6,628	4,530	4,530	4,530	4,530	4,530
	Rural		6,773	8,049	14,822	27,244				6,773	18,564	25,337	6,628	4,530	4,530	4,530	4,530	4,530
	Total	2,098	6,773	10,379	19,250	34,221	6,628	6,628	14,822	6,773	18,564	25,337	6,628	4,530	4,530	4,530	4,530	4,530
Governor Generoso	Urban	2,929		4,647	7,576	11,883	11,289	11,289	11,883	15,479	21,422	36,901	11,289	8,360	8,360	8,360	8,360	8,360
	Rural		15,479	6,203	21,682	39,678				15,479	21,422	36,901	11,289	8,360	8,360	8,360	8,360	8,360
	Total	2,929	15,479	10,850	29,258	51,561	11,289	11,289	21,682	15,479	21,422	36,901	11,289	8,360	8,360	8,360	8,360	8,360
Lupon	Urban	2,825	821	11,025	14,671	22,533	21,406	21,406	22,533	5,614	33,404	39,147	21,406	18,581	18,581	18,581	18,581	18,581
	Rural	129	5,614	21,662	27,405	42,094	129	129	21,662	5,614	33,404	39,147	21,406	18,581	18,581	18,581	18,581	18,581
	Total	2,954	6,435	32,687	42,076	64,627	64,627	64,627	42,094	5,614	33,404	60,553	21,535	18,581	18,581	18,581	18,581	18,581
Manay	Urban	5,492	800	18,734	19,085	35,333	35,333	35,333	35,333	351	32,509	32,860	351	3,992	3,992	3,992	3,992	3,992
	Rural		351	18,734	19,085	35,333				351	32,509	32,860	351	3,992	3,992	3,992	3,992	3,992
	Total	5,492	1,151	18,734	19,085	35,333	35,333	35,333	35,333	351	32,509	32,860	351	3,992	3,992	3,992	3,992	3,992
Mati (Capital)	Urban	16,453	162	16,627	33,242	51,551	48,973	48,973	51,551	3,049	24,157	57,732	48,973	32,520	32,520	32,520	32,520	32,520
	Rural	3,049	24,157	7,105	34,311	62,077	3,049	3,049	7,105	24,157	57,732	48,973	32,520	23,421	23,421	23,421	23,421	23,421
	Total	19,502	24,319	23,732	67,553	113,628	52,022	52,022	62,077	24,157	30,526	106,705	52,022	32,520	32,520	32,520	32,520	32,520
San Isidro	Urban	3,721	800	2,805	7,326	11,566	10,988	10,988	11,566	8,824	15,852	24,836	10,988	7,267	7,267	7,267	7,267	7,267
	Rural	160	8,824	5,514	14,498	26,705	160	160	14,498	8,824	15,852	24,836	10,988	7,267	7,267	7,267	7,267	7,267
	Total	3,881	9,624	8,319	21,824	38,271	38,271	38,271	26,705	8,824	15,852	35,824	11,148	7,267	7,267	7,267	7,267	7,267
Tarragona	Urban	2,109	1,500	38	3,647	5,885	5,591	5,591	5,885	3,005	15,995	19,000	5,591	3,482	3,482	3,482	3,482	3,482
	Rural		3,005	7,887	10,854	20,430				3,005	15,995	19,000	5,591	3,482	3,482	3,482	3,482	3,482
	Total	2,109	4,505	7,887	14,501	26,315	5,591	5,591	20,430	3,005	15,995	24,591	5,591	3,482	3,482	3,482	3,482	3,482
Provincial Total	Urban	47,027	5,181	51,250	103,458	161,065	153,012	153,012	161,065	78,156	230,886	335,553	153,012	105,985	105,985	105,985	105,985	105,985
	Rural	6,511	78,156	117,322	201,989	360,809	6,511	6,511	201,989	78,156	230,886	335,553	6,511	133,564	133,564	133,564	133,564	133,564
	Total	53,538	83,337	168,572	305,447	521,874	521,874	521,874	360,809	156,312	461,772	671,106	159,523	239,549	239,549	239,549	239,549	239,549

8.5.2 Sanitation

Table 8.5.4 Additional Number of Households to be Served in Phase I (Household Toilets)

Name of Municipality	Area	No. of Household Served in the Based Year					Phase I Coverage (2003)									
		Total					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		
Baganga	Urban	158	1,510		1,668	2,814	788	1,182		1,970	630			630		
	Rural		4,296	5	4,301	5,825		4,208	743	4,951			738			
	Total	158	5,806	5	4,301	8,639	788	5,390	743	6,921	630		738	1,368		
Banaybanay	Urban	350	1,190		1,540	2,324	350	1,277		1,627			87			
	Rural		3,107	5	3,112	4,841		3,498	617	4,115			391			
	Total	350	4,297	5	3,112	7,165	350	4,775	617	5,742			612	1,003		
Boston	Urban	34	387		421	507	34	387		421						
	Rural		871	5	876	1,597		1,153	204	1,357			282			
	Total	34	1,258	5	876	2,104	34	1,540	204	1,778			282	199		
Caraga	Urban	127	535		662	1,158	324	487		811	197					
	Rural		4,679	5	4,684	5,734		4,143	731	4,874			726			
	Total	127	5,214	5	4,684	6,892	324	4,630	731	5,685	197		726	923		
Cateel	Urban	95	756		851	1,182	95	756		851						
	Rural		3,016	5	3,021	4,635		3,349	591	3,940			333			
	Total	95	3,772	5	3,021	5,817	95	4,105	591	4,791			333	586		
Governor Generoso	Urban	107	1,212		1,319	2,054	575	863		1,438	468					
	Rural		4,567	5	4,572	6,870		4,964	876	5,840			397			
	Total	107	5,779	5	4,572	8,924	575	5,827	876	7,278	468		871	1,268		
Lupon	Urban	371	1,110		1,481	3,803	1,065	1,597		2,662	694					
	Rural		6,194	5	6,199	7,282		5,269	930	6,199			925			
	Total	371	7,304	5	6,199	11,085	1,065	6,866	930	8,861	694		925	2,106		
Manay	Urban	238	703		941	1,683	471	707		1,178	233					
	Rural		3,925	5	3,930	6,153		4,445	785	5,230			4			
	Total	238	4,628	5	3,930	7,836	471	5,152	785	6,408	233		780	1,300		
Man (Capital)	Urban	2,606	2,002		4,608	9,293	2,602	3,903		6,505			1,901			
	Rural		5,317	7	5,324	11,040		7,976	1,408	9,384			2,659			
	Total	2,606	7,319	7	5,324	20,333	2,602	11,879	1,408	15,889			4,560	1,401		
San Isidro	Urban	227	971		1,198	1,997	559	839		1,399	332					
	Rural		3,751	5	3,756	4,500		3,251	574	3,825			569			
	Total	227	4,722	5	3,756	6,497	559	4,090	574	5,223	332		569			
Tarragona	Urban	65	372		437	1,010	283	424		707	218					
	Rural		2,382	5	2,387	3,459		2,499	441	2,940			117			
	Total	65	2,754	5	2,387	4,469	283	2,923	441	3,647	218		436			
Provincial Total	Urban	4,378	10,748		15,126	27,825	7,146	12,422		19,268	2,772		2,531			
	Rural		42,105	57	42,162	61,936		44,755	7,900	52,655			4,699			
	Total	4,378	52,853	57	57,288	89,761	7,146	57,177	7,900	72,223	2,772		7,230	17,843		

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)							
		Flush	Pour Flush	VIP/Dry	Total	Total No. of HHs	Household Coverage			Additional No. of HHs to be Served				
							Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total
Baganga	Urban	788	1,182	743	1,970	4,248	1,976	1,975	743	3,951	1,188	793		1,981
	Rural		4,208	743	4,951	8,435	7,102	743	7,845			2,894		2,894
	Total	788	5,390	743	6,921	12,683	1,976	9,077	743	11,796	1,188	3,687		4,875
Bantayanay	Urban	350	1,277		1,627	3,509	1,632	1,631	617	3,263	1,282	354		1,636
	Rural		3,498	617	4,115	7,431	6,294	617	6,911			2,796		2,796
	Total	350	4,775	617	5,742	10,940	1,632	7,925	617	10,174	1,282	3,150		4,432
Boston	Urban	34	387		421	753	350	350	700	316				316
	Rural		1,153	204	1,357	2,563	2,180	204	2,384			1,027		1,027
	Total	34	1,540	204	1,778	3,316	350	2,530	204	3,084	316	1,027		1,343
Caraga	Urban	324	487		811	1,662	773	773	1,546	449		286		735
	Rural		4,143	731	4,874	8,384	7,066	731	7,797			2,923		2,923
	Total	324	4,630	731	5,685	10,046	773	7,839	731	9,343	449	3,209		3,658
Cateel	Urban	95	4,105	591	4,791	8,555	811	811	1,622	716		55		771
	Rural		3,349	591	3,940	6,811	5,743	591	6,334			2,394		2,394
	Total	95	7,454	1,182	8,633	15,366	13,554	1,402	12,152	716	716	2,449		3,165
Governor Generoso	Urban	575	863		1,438	2,971	1,382	1,381	2,763	807		518		1,325
	Rural		4,964	876	5,840	9,920	8,350	876	9,226			3,386		3,386
	Total	575	5,827	876	7,278	12,891	1,382	9,731	876	11,989	807	3,904		4,711
Lupon	Urban	1,065	1,597		2,662	5,633	2,620	2,619	5,239	1,555		3,588		3,588
	Rural		5,269	930	6,199	10,524	8,857	930	9,787			4,610		4,610
	Total	1,065	6,866	930	8,861	16,157	2,620	11,476	930	15,026	1,555	8,200		9,798
Manay	Urban	471	707		1,178	2,496	1,161	1,160	2,321	690		453		1,143
	Rural		4,445	785	5,230	8,833	7,430	785	8,215			2,985		2,985
	Total	471	5,152	785	6,408	11,329	1,161	8,590	785	10,536	690	3,438		4,128
Mati (Capital)	Urban	2,602	3,903		6,505	12,888	5,993	5,993	11,986	3,391		2,090		5,481
	Rural		7,976	1,408	9,384	15,519	13,025	1,408	14,433			5,049		5,049
	Total	2,602	11,879	1,408	15,889	28,407	5,993	19,018	1,408	26,419	3,391	7,139		10,530
San Isidro	Urban	559	839		1,398	2,892	1,345	1,345	2,690	786		506		1,292
	Rural		3,251	574	3,825	6,676	5,635	574	6,209			2,384		2,384
	Total	559	4,090	574	5,223	9,568	1,345	6,980	574	8,399	786	2,890		3,676
Tarragona	Urban	283	424		707	1,471	684	684	1,368	401		260		661
	Rural		2,499	441	2,940	5,108	4,309	441	4,750			1,810		1,810
	Total	283	2,923	441	3,647	6,579	684	4,993	441	6,118	401	2,070		2,471
Provincial Total	Urban	7,146	12,422		19,568	40,267	18,727	18,722	37,449	11,581		6,337		17,918
	Rural		44,755	7,900	52,655	90,204	75,991	7,900	83,891			31,236		31,236
	Total	7,146	57,177	7,900	72,223	130,471	18,727	94,713	7,900	121,340	11,581	37,573		49,154

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 (1997)	Projected No. of Public School Student in 2000	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
Baganga	3,280	11,331	8,498	5,218	13,008	12,358	3,860
Banaybanay	7,766	8,746	6,560	0	9,853	9,360	2,800
Boston	480	3,787	2,840	2,360	3,557	3,379	539
Caraga	3,040	10,005	7,504	4,464	11,445	10,873	3,369
Cateel	3,560	8,282	6,212	2,652	9,231	8,769	2,557
Governor Generoso	3,640	12,306	9,230	5,590	14,271	13,557	4,327
Lupon	7,120	14,262	10,697	3,577	16,902	16,057	5,360
Manay	4,040	9,314	6,986	2,946	10,477	9,953	2,967
Mati (Capital)	16,320	27,247	20,435	4,115	29,578	28,099	7,664
San Isidro	5,840	8,543	6,407	567	9,862	9,369	2,962
Tarragona	2,120	4,858	3,644	1,524	7,315	6,949	3,305
Provincial Total	57,206	118,681	89,013	33,013	135,499	128,723	39,710

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 (1997)		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
Baganga	Public Market	2	1	3	1	2	5	3	5
	Bus/Jeepney Terminal	2	1	3	1	2	5	3	5
	Parks/Playground	2	1	3	1	2	7	5	7
	Total	6	3	9	3	6	17	11	17
Banaybanay	Public Market	1	1	1		1	2	1	2
	Bus/Jeepney Terminal	2	1	2	1	2	2		2
	Parks/Playground	1	1	1		1	6	5	6
	Total	4	3	4	1	4	10	6	10
Boston	Public Market	2	1	2	1	2	3	1	3
	Bus/Jeepney Terminal	1		2	1	1	3	2	3
	Parks/Playground	1		2	1	1	5	4	5
	Total	4	1	6	3	4	11	7	11
Caraga	Public Market	2	1	2	1	2	3	1	3
	Bus/Jeepney Terminal	1		2	1	1	2	1	2
	Parks/Playground	1		1	1	1	5	4	5
	Total	4	1	5	3	4	10	6	10
Careel	Public Market	1		1	1	1	2	1	2
	Bus/Jeepney Terminal	1		2	1	1	2	1	2
	Parks/Playground	2	1	2	1	2	7	5	7
	Total	4	1	5	3	4	11	7	11
Governor Generoso	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	5	4	5
	Total	3	1	3	2	3	9	6	9
Lupon	Public Market	1	1	2	1	2	3	1	3
	Bus/Jeepney Terminal	1		2	1	1	2	1	2
	Parks/Playground	1	1	2	1	2	7	5	7
	Total	3	2	6	3	5	12	7	12
Manay	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	3	2	3
	Total	3	2	3	1	3	7	4	7
Mati (Capital)	Public Market	2	1	3	1	2	5	3	5
	Bus/Jeepney Terminal	1	1	2	1	2	3	1	3
	Parks/Playground	3	3	5	1	4	13	9	13
	Total	6	5	10	3	8	21	13	21
San Isidro	Public Market	1	1	1		1	2	1	2
	Bus/Jeepney Terminal	2	1	2	1	2	3	1	3
	Parks/Playground	1	1	1		1	5	4	5
	Total	4	3	4	1	4	10	6	10
Tarragona	Public Market	1	1	2	1	2	2		2
	Bus/Jeepney Terminal			1	1	1	1		1
	Parks/Playground			1	1	1	3	2	3
	Total	1	1	4	3	4	6	2	6
Provincial Total	Public Market	15	9	19	8	17	31	14	31
	Bus/Jeepney Terminal	13	4	20	12	15	27	12	27
	Parks/Playground	14	10	20	7	17	66	49	66
	Total	42	23	59	26	49	124	75	124

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 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. Forty-nine (49) untapped springs suitable for Level II system were confirmed during this PW4SP preparation.

(2) Required well drilling and rehabilitation equipment

Presently, two units of truck-mounted percussion drilling rig is available at DPWH-DEO in the province, however, they were purchased in early 1980s.

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	Coverage in 1997		Type of Water Source	Plan for Expansion	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (m ³ /day)	Number of Spring Dev't/ Deep Well	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (m ³ /day)	Number of Spring Dev't/ Deep Well																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
			No. of Barangays Served	Served Population																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Baganga	Baganga WD	Urban	2	2,280	SP	No	4,451	818	445	1	9,410	2,353	941	2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		Rural													Total	2	2,280	Banaybanay	Pintatagan	Urban		1,324	SP	No					13,335	3,334	1,334	2	Rural	1	1,324	Total	1	1,324	Bostuo	Not Applicable	Urban	N.A.	N.A.	N.A.	N.A.	1,121	209	112	1	1,741	435	174	1	Rural	N.A.	N.A.	Total	N.A.	N.A.	Caraga	Poblacion	Urban	1	2,021	SP	No	1,527	295	153	1	2,267	692	227	1	Rural			Total	1	2,021	San Luis		Urban	1	1,109	SP	No									Rural	1	1,109	Total	2	2,218	Santiago		Urban	1	740	SP	No									Rural	1	740	Total	2	1,480	Municipal Total		Urban	1	2,021												Rural	2	1,849	Total	3	3,870	Cateel	Not Applicable	Urban	N.A.	N.A.	N.A.	N.A.	2,096	392	210	1	4,530	1,133	453	1	Rural	N.A.	N.A.	Governor Generoso	Mun. LGU	Urban	1	805	DW	No	1,452	276	145	1	8,360	2,090	836	2	Rural			Total	1	805	Figuasari		Urban	1	672	SP	No									Rural			Municipal Total		Urban	2	1,477												Rural			Total		Urban	2	1,477												Rural			Lupao	Macangao	Urban	1	129	DW	No					18,551	4,645	1,858	3	Rural	1	129	Total	2	258	Lupao WD		Urban	1	2,825	DW	No									Rural			Municipal Total		Urban	2	3,022												Rural	1	129	Total		Urban	3	3,151												Rural	1	129	Manay	Central	Urban	1	1,500	SP	No	3,992	748	399	1	3,992	998	399	1	Rural			Meri (Capital)	Macambol	Urban	1	2,872	SP	No	1,925	377	193	7	32,520	8,130	3,252	5	Rural	1	2,872	Total	2	5,744	Mad WD		Urban	2	2,560	OW	No									Rural			Total		Urban	2	2,560												Rural			Madiao		Urban	1	1,959	DW	No									Rural			Total		Urban	1	1,959												Rural			NMA, Homeowners Ass.		Urban	1	1,446	DW	No									Rural			Total		Urban	1	1,446												Rural			Capital Water System		Urban	1	509	DW	N.A.									Rural			Total		Urban	1	509												Rural			Salaz		Urban	1	3,054	SP	No									Rural			Total		Urban	1	3,054												Rural			Sanghay		Urban		60	SP	No									Rural	1	60	Total	1	60	Municipal Total		Urban	6	14,528												Rural	2	2,932	Total	8	17,460	San Isidro	Brisogan	Urban	1	186	DW	No	1,561	299	156	1	7,267	1,817	727	1	Rural	1	160	Total	2	346	San Isidro WD		Urban	1	2,160	DW	No									Rural			Total		Urban	2	2,160												Rural	1	160	Municipal Total		Urban	2	2,346												Rural	1	160	Total		Urban	4	4,692												Rural	1	160	Farragona	Not Applicable	Urban	N.A.	N.A.	N.A.	N.A.	2,109	409	211	1	3,432	871	348	1	Rural	N.A.	N.A.	Provincial Total		Urban	14	26,791			20,276	3,822
Banaybanay	Pintatagan	Urban		1,324	SP	No					13,335	3,334	1,334	2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Bostuo	Not Applicable	Urban	N.A.	N.A.	N.A.	N.A.	1,121	209	112	1	1,741	435	174	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Lupao	Macangao	Urban	1	129	DW	No					18,551	4,645	1,858	3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Farragona	Not Applicable	Urban	N.A.	N.A.	N.A.	N.A.	2,109	409	211	1	3,432	871	348	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Provincial Total		Urban	14	26,791			20,276	3,822	2,024	9	105,935	26,498	10,599	20																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		Rural	7	6,394																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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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 ³ /day)
Baganga	Baganga WD				
	Pintatagan				
	Poblacion				
	San Luis				
	Santiago				
	Municipal Total				
Lupon	Macangao				
	Lupon WD				
	Municipal Total				
Manay Mati (Capital)	Central				
	Macambol				
	Mati WD				
	Matia				
	NHA, Homeowners Ass.				
	Sainz				
	Sanghay				
	Taguibo				
	Municipal Total				
		Mun. LGU			
Governor Generoso	Tiruwasai				
	Municipal Total				
San Isidro	Bitagan				
	San Isidro WD				
	Municipal Total				

Medium size rotary drilling rig (truck-mounted top-head drive 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

- 1 set for the total 51 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 51 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 drilling rig, 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 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 rotary and percussion rigs for hauling drilling tools and water.

8.6.2 Sanitation

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	VIP/Dry	Total	Flush	VIP/Dry	Total	Flush	VIP/Dry	Total	Flush	VIP/Dry	Total
Baganga	630		630	630		630	1,188	793	1,981	1,188	793	1,981
Banaybanay		87	87		87	87	1,282	354	1,636	1,282	354	1,636
Boston							316		316	316		316
Caraga	197		197	197		197	449	286	735	449	286	735
Cateel							716	55	771	716	55	771
Governor Generoso	468		468	468		468	807	518	1,325	807	518	1,325
Lupon	694	487	1,181	694	487	1,181	1,555	1,022	2,577	1,555	1,022	2,577
Manay	233	4	237	233	4	237	690	453	1,143	690	453	1,143
Mati (Capital)		1,901	1,901		1,901	1,901	3,391	2,090	5,481	3,391	2,090	5,481
San Isidro	332		332	332		332	786	506	1,292	786	506	1,292
Tarragona	218	52	270	218	52	270	401	260	661	401	260	661
Provincial Total	2,772	2,531	5,303	2,772	2,531	5,303	11,581	6,337	17,918	11,581	6,337	17,918

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	VIP/Dry	Total	Flush	VIP/Dry	Total	Flush	VIP/Dry	Total	Flush	VIP/Dry	Total
Baganga		738	738		738	738		738		2,894		2,894
Banaybanay		612	1,003		391	612		1,003		2,796		2,796
Boston		199	481		282	199		481		1,027		1,027
Caraga		726	726		726	726		726		2,923		2,923
Cateel		586	919		333	586		919		2,394		2,394
Governor Generoso		871	1,268		397	871		1,268		3,386		3,386
Lupon		925	925		925	925		925		3,588		3,588
Manay		780	1,300		520	780		1,300		2,985		2,985
Mati (Capital)		1,401	4,060		2,659	1,401		4,060		5,049		5,049
San Isidro		569	569		569	569		569		2,384		2,384
Tarragona		436	553		117	436		553		1,810		1,810
Provincial Total		7,843	12,542		4,699	7,843		12,542		31,236		31,236

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
Baganga	5,218	131	27	3,860	97	20
Banaybanay				2,800	70	14
Boston	2,360	59	12	539	14	3
Caraga	4,464	112	23	3,369	85	17
Cateel	2,652	67	14	2,557	64	13
Governor Generoso	5,590	140	28	4,327	109	22
Lupon	3,577	90	18	5,360	134	27
Manay	2,946	74	15	2,967	75	15
Mati (Capital)	4,115	103	21	7,664	192	39
San Isidro	567	15	3	2,962	75	15
Tarragona	1,524	39	8	3,305	83	17
Provincial Total	33,013	830	169	39,710	998	202

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
Baganga	1	1	1	3	3	3	5	11
Banaybanay		1		1	1		5	6
Boston	1	1	1	3	1	2	4	7
Caraga	1	1	1	3	1	1	4	6
Cateel	1	1	1	3	1	1	5	7
Governor Generoso	1	1		2	1	1	4	6
Lupon	1	1	1	3	1	1	5	7
Manay		1		1	1	1	2	4
Mati (Capital)	1	1	1	3	3	1	9	13
San Isidro		1		1	1	1	4	6
Tarragona	1	1	1	3			2	2
Provincial Total	8	11	7	26	14	12	49	75