

#### **4.1.5 Level I Facilities**

##### **Safe and Unsafe Classification of Level I Facilities**

Safe and unsafe classification of Level I sources/facilities other than shallow wells are processed as classified in the questionnaire complied with DOH definition. While, shallow wells both public and private are classified assuming that 70% of them are safe. This assumption is made in consideration of that:

- The PHO has been conducting water quality analysis of samples collected from public and private Level I wells, but has not achieved to cover all municipalities due to shortage of chemical reagents and the latest analysis results are not properly recorded/stored.
- The PHO field inspection revealed that approximately 11% of Level I sources/facilities were considered unsafe/doubtful.
- When the manner of construction adopted by PPDO/PEO and DPWH as well as the prevailing O&M practices are taken into account, the unsafe percentage may increase to approximately 26%.
- Due to the absence of sufficient and appropriate data for safe and unsafe classification, 70% is adopted as safe percentage for planning purpose based on the experiences of PW4SP in neighboring provinces.

The safe/unsafe percentage is uniformly applied to all municipalities both for public and private shallow wells. Table 4.1.3 presents number of Level I facilities by safe and unsafe classification.

#### **4.1.6 Water Supply Service Coverage**

##### **Estimation of Service Coverage in Terms of Safe, Unsafe and Unserved Classification**

Although majority of population both in urban and rural areas have access to Level III or II services (95% in urban area and 84% in rural area), there are still considerable number of population depending on Level I sources/facilities or without access to water supply facilities.

In estimation of service coverage, the unserved population was prefixed referring to the profile in 1990 population census data, "Households by Main Source of Drinking Water and City/Municipality." Of the rest of the population, those who are not served by Level III and/or II systems were considered to be covered by shared or own use of Level I facilities,

Table 4.1.3 Number of Level I Facilities by Safe and Unsafe Classification

NEDA Geographic Profile	Municipality	Type	Safe Sources										Unsafe Sources										Grand Total
			Public					Private					Public					Private					
			Deep Well	Shallow Well	Covered/Improved Dug Well	Developed Spring	Sub-total	Deep Well	Shallow Well	Covered/Improved Dug Well	Sub-total	Total	Shallow Well	Open Dug Well	Undeveloped Spring	Sub-total	Shallow Well	Open Dug Well	Rain Water Collector	Sub-total	Total		
045201	Bangued (Capital)	Urban	8	22	0	0	30	0	0	138	138	168	10	0	0	0	0	0	0	0	10	178	
		Rural	30	29	22	11	92	21	0	168	189	281	13	0	0	0	0	0	0	0	13	294	
		Total	38	51	22	11	122	21	0	306	327	449	23	0	0	0	0	0	0	0	23	472	
045202	Boliney	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
045203	Bucay	Urban	5	1	0	0	6	0	0	24	24	30	1	0	0	0	0	0	0	0	1	31	
		Rural	3	8	0	0	11	8	0	56	64	75	4	0	0	0	0	0	0	0	4	79	
		Total	8	9	0	0	17	8	0	80	88	105	5	0	0	0	0	0	0	0	5	110	
045204	Ilocos	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
045205	Dagupan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
045206	Danglas	Urban	3	0	0	0	3	0	0	40	40	43	0	0	0	0	0	0	0	0	0	43	
		Rural	5	0	0	5	10	0	0	23	23	33	0	0	0	0	0	0	0	0	0	33	
		Total	8	0	0	5	13	0	0	63	63	76	0	0	0	0	0	0	0	0	0	76	
045207	Dolores	Urban	4	0	0	0	4	2	0	8	10	14	0	0	0	0	0	0	0	0	0	14	
		Rural	59	1	0	2	62	140	0	73	213	275	1	0	0	0	0	0	0	0	1	276	
		Total	63	1	0	2	66	142	0	81	223	289	1	0	0	0	0	0	0	0	1	290	
045208	Lacub	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Rural	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Total	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
045209	Laginglang	Urban	5	0	0	0	5	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5	
		Rural	80	1	0	5	86	20	0	4	24	110	1	0	0	0	0	0	0	0	0	119	
		Total	85	1	0	5	91	20	0	4	24	115	1	0	0	0	0	0	0	0	0	124	
045210	Lagayan	Urban	3	1	0	0	4	0	0	4	4	8	1	0	0	0	0	0	0	0	0	9	
		Rural	2	0	0	0	2	0	0	2	2	4	0	0	0	0	0	0	0	0	0	4	
		Total	5	1	0	0	6	0	0	6	6	12	1	0	0	0	0	0	0	0	0	13	
045211	Langiden	Urban	0	1	0	0	1	3	0	2	5	6	0	0	0	0	0	0	0	0	0	6	
		Rural	2	1	0	0	3	5	0	4	9	12	0	0	0	0	0	0	0	0	0	12	
		Total	2	2	0	0	4	8	0	6	14	18	0	0	0	0	0	0	0	0	0	18	
045212	La Paz	Urban	24	0	5	0	29	65	0	24	89	118	0	0	0	0	0	0	0	0	0	118	
		Rural	12	0	6	0	18	102	0	35	127	155	0	0	0	0	0	0	0	0	0	155	
		Total	36	0	11	0	47	167	0	59	216	273	0	0	0	0	0	0	0	0	0	273	
045213	Licuan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
045214	Luba	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Table 4.1.3 Number of Level I Facilities by Safe and Unsafe Classification (Cont'd.)

NEDA Geo- graphic Code	Municipality	Type	Safe Sources										Unsafe Sources										Grand Total
			Public					Private					Public					Private					
			Deep Well	Shallow Well	Covered/ Improved Dug Well	Developed Spring	Sub- total	Deep Well	Shallow Well	Covered/ Improved Dug Well	Sub- total	Total	Shallow Well	Open Dug Well	Undevelop- ed Spring	Sub- total	Shallow Well	Open Dug Well	Rain Water Collector	Sub- total	Total		
045215	Malibong	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
045216	Manabo	Urban	0	19	0	0	19	0	0	108	108	127	8	0	0	0	0	0	0	0	8		
		Rural	0	13	0	0	13	0	0	52	52	65	5	0	0	0	0	0	0	0	5		
		Total	0	32	0	0	32	0	0	160	160	192	13	0	0	0	0	0	0	0	13		
045217	Pinarubia	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Rural	3	1	0	0	4	0	0	0	0	4	1	0	0	0	0	0	0	0	1		
		Total	3	1	0	0	4	0	0	0	0	4	1	0	0	0	0	0	0	0	1		
045218	Pidigan	Urban	4	0	0	0	4	15	0	0	0	15	19	0	0	0	0	0	0	0	19		
		Rural	20	7	0	0	27	0	0	30	30	57	3	0	0	0	0	0	0	0	3		
		Total	24	7	0	0	31	15	0	0	30	45	76	3	0	0	0	0	0	0	3		
045219	Pilar	Urban	6	0	0	0	6	10	0	0	0	10	17	0	0	0	0	0	0	0	0		
		Rural	45	4	0	5	54	0	6	0	6	60	1	0	0	0	0	0	0	0	1		
		Total	51	4	0	5	60	10	6	0	6	72	18	0	0	0	0	0	0	0	1		
045220	Salapadan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
045221	San Isidro	Urban	12	0	0	0	12	12	0	0	0	12	24	0	0	0	0	0	0	0	0		
		Rural	11	0	0	0	11	33	0	0	0	33	44	0	0	0	0	0	0	0	0		
		Total	23	0	0	0	23	45	0	0	0	45	68	0	0	0	0	0	0	0	0		
045222	San Juan	Urban	4	0	0	0	4	4	2	10	0	6	18	22	0	0	0	0	0	0	0		
		Rural	35	30	0	0	65	34	89	15	138	203	13	0	0	0	0	0	0	0	0		
		Total	39	30	0	0	69	36	99	21	156	225	13	0	0	0	0	0	0	0	0		
045223	San Quintin	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Rural	6	2	0	0	8	8	9	0	11	20	28	1	0	0	0	0	0	0	1		
		Total	6	2	0	0	8	8	9	0	11	20	28	1	0	0	0	0	0	0	1		
045224	Tayum	Urban	10	6	0	0	16	8	0	0	6	14	30	3	0	0	0	0	0	0	0		
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Total	10	6	0	0	16	8	0	0	6	14	30	3	0	0	0	0	0	0	0		
045225	Tineg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
045226	Tubog	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
045227	Villavieja	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Provincial Total		Urban	88	50	0	0	138	125	10	0	16	141	642	23	0	0	25	4	0	0	29		
		Rural	313	126	45	39	523	385	95	517	997	1,520	561	3	0	90	109	40	10	0	54		
		Total	401	176	45	39	668	510	105	879	1,494	2,162	79	3	90	114	44	10	0	0	54		

because it is common practice to share private wells with neighbors where public water sources are insufficient. The calculation procedure is as follows:

- Service percentage/population of Level III and Level II systems was estimated based on the questionnaire survey results.
- Percentage of unserved population (using undeveloped spring, lake, river, peddler, etc.) reported in the 1990 population census was assumed to have unchanged up to present.
- Population covered by Level I facilities were calculated as a balance figure between the total population, and the population served by Level III and II systems and the unserved population.
- Level I population coverage was estimated in assumption that 50% of the private facilities were shared by neighbors.

Unserved population and the population covered by Level I facilities are presented in Table 4.1.4. Table 4.1.5 presents overall population covered by Level I facilities and number of households.

Number of households per shared public/private facility ranges from 5 to 30 households, which are considered within the reasonable level, as more or less equivalent to the service level standard of Level I public facility (15 households/facility) and Level II system (5 household/public faucet). Some municipalities showing large number of households on this calculation is deemed to be caused by the presence of unreported private facilities.

Table 4.1.4 Estimation of Unserved Population by Municipality

NEDA Geo- graphic Code	Municipality	Type	Population and Households		Served Population			Unserved Population			Population Covered by Level I Facilities	
			Number	HHs Size	Level III	Level II	Total	Unserved Percentage (1990)		Unserved Population (1995)		
								Total No. of HHs	Number of Unserved HHs			%
045201	Bangued (Capital)	Urban	14,904	5.3	10,309	0	10,309	2,650	18	0.7	101	4,494
		Rural	22,455	5.4	4,309	2,544	6,853	3,727	152	4.1	916	14,686
		Total	37,359	5.4	14,618	2,544	17,162	6,377	170	2.7	1,017	19,180
045202	Boliney	Urban	770	5.5	675	35	710	132	7	5.3	41	19
		Rural	3,424	5.4	2,265	340	2,605	560	47	8.4	287	532
		Total	4,194	5.5	2,940	375	3,315	692	54	7.8	328	551
045203	Bucay	Urban	2,753	5.4	0	1,080	1,080	495	23	4.6	128	1,545
		Rural	11,107	5.6	290	4,357	4,647	1,890	195	10.3	1,146	5,314
		Total	13,860	5.6	290	5,437	5,727	2,385	218	9.1	1,274	6,859
045204	Buctoc	Urban	0	0.0	0	0	0	0	0	0.0	0	0
		Rural	2,120	5.6	0	1,008	1,008	345	0	0.0	0	1,112
		Total	2,120	5.6	0	1,008	1,008	345	0	0.0	0	1,112
045205	Daguoman	Urban	0	0.0	0	0	0	0	0	0.0	0	0
		Rural	1,500	5.3	0	610	610	268	0	0.0	0	890
		Total	1,500	5.3	0	610	610	268	0	0.0	0	890
045206	Danglas	Urban	1,555	5.1	0	364	364	278	6	2.2	34	1,157
		Rural	1,701	5.1	215	587	802	316	48	15.2	258	641
		Total	3,256	5.1	215	951	1,166	594	54	9.1	292	1,798
045207	Dolores	Urban	1,867	5.0	1,250	0	1,250	347	4	1.2	22	595
		Rural	7,395	5.5	125	579	704	1,247	32	2.6	190	6,501
		Total	9,262	5.4	1,375	579	1,954	1,594	36	2.3	212	7,096
045208	Lucub	Urban	671	5.5	0	324	324	114	11	9.6	65	282
		Rural	1,815	5.6	0	476	476	306	97	31.7	575	764
		Total	2,486	5.5	0	800	800	420	108	25.7	640	1,046
045209	Lagangilang	Urban	2,490	5.3	1,025	0	1,025	423	44	10.4	259	1,206
		Rural	9,772	5.6	435	0	435	1,608	364	22.6	2,212	7,125
		Total	12,262	5.5	1,460	0	1,460	2,031	408	20.1	2,471	8,331

Table 4.1.4 Estimation of Unserved Population by Municipality (Cont'd.)

NEDA Geo- graphic Code	Municipality	Type	Population and Households		Served Population			Unserved Population				Population Covered by Level I Facilities
			Number	HHs Size	Level III	Level II	Total	Unserved Percentage (1990)			Unserved Population (1995)	
								Total No. of HHs	Number of Unserved HHs	%		
045210	Lagayan	Urban	854	5.3	0	0	0	157	30	19.1	163	691
		Rural	2,580	5.3	0	531	531	552	253	45.8	1,183	866
		Total	3,434	5.3	0	531	531	709	283	39.9	1,346	1,557
045211	Langiden	Urban	350	4.7	0	120	120	72	2	2.8	10	220
		Rural	2,206	4.9	0	221	221	434	18	4.1	91	1,894
		Total	2,556	4.8	0	341	341	506	20	4.0	101	2,114
045212	La Paz	Urban	3,362	5.3	0	0	0	579	47	8.1	273	3,089
		Rural	9,058	5.0	0	0	0	1,626	399	24.5	2,223	6,835
		Total	12,420	5.1	0	0	0	2,205	446	20.2	2,496	9,924
045213	Licuan	Urban	654	5.4	395	190	585	117	5	4.3	28	41
		Rural	3,391	5.9	965	1,198	2,163	520	43	8.3	280	948
		Total	4,045	5.8	1,360	1,388	2,748	637	48	7.5	308	989
045214	Luba	Urban	1,167	5.8	815	116	931	176	6	3.4	40	196
		Rural	4,765	5.4	605	1,139	1,744	845	46	5.4	259	2,762
		Total	5,932	5.5	1,420	1,255	2,675	1,021	52	5.1	299	2,958
045215	Malibcong	Urban	0	0.0	0	0	0	0	0	0.0	0	0
		Rural	3,705	5.9	0	2,845	2,845	596	114	19.1	709	151
		Total	3,705	5.9	0	2,845	2,845	596	114	19.1	709	151
045216	Manabo	Urban	3,968	5.2	0	1,196	1,196	687	3	0.4	17	2,755
		Rural	4,515	5.1	0	2,219	2,219	828	24	2.9	131	2,165
		Total	8,483	5.1	0	3,415	3,415	1,515	27	1.8	148	4,920
045217	Penarrubia	Urban	1,049	5.5	829	220	1,049	172	3	1.7	0	0
		Rural	4,299	5.6	1,596	784	2,380	704	23	3.3	140	1,779
		Total	5,348	5.6	2,425	1,004	3,429	876	26	3.0	140	1,779
045218	Pidigan	Urban	2,655	5.6	0	980	980	435	6	1.4	37	1,638
		Rural	7,113	5.5	0	732	732	1,168	51	4.4	311	6,070
		Total	9,768	5.5	0	1,712	1,712	1,603	57	3.6	348	7,708

Table 4.1.4 Estimation of Unserved Population by Municipality (Cont'd.)

NEDA Geo- graphic Code	Municipality	Type	Population and Households		Served Population			Unserved Population				Population Covered by Level I Facilities
			Number	HHs Size	Level III	Level II	Total	Unserved Percentage (1990)			Unserved Population (1995)	
								Total No. of HHs	Number of Unserved HHs	%		
045219	Pilar	Urban	1,303	5.5	1,000	178	1,178	229	23	10.0	125	0
		Rural	7,660	5.3	965	1,156	2,121	1,353	189	14.0	1,070	4,469
		Total	8,963	5.3	1,965	1,334	3,299	1,582	212	13.4	1,195	4,469
045220	Sal-lapadan	Urban	1,424	5.5	0	660	660	234	0	0.0	0	764
		Rural	3,892	5.5	0	2,614	2,614	668	0	0.0	0	1,278
		Total	5,316	5.5	0	3,274	3,274	902	0	0.0	0	2,042
045221	San Isidro	Urban	552	6.1	0	240	240	82	4	4.9	27	285
		Rural	3,572	5.5	0	330	330	593	33	5.6	199	3,043
		Total	4,124	5.6	0	570	570	675	37	5.5	226	3,328
045222	San Juan	Urban	1,329	4.8	0	216	216	257	19	7.4	98	1,015
		Rural	7,797	5.0	0	0	0	1,429	155	10.8	846	6,951
		Total	9,126	5.0	0	216	216	1,686	174	10.3	944	7,966
045223	San Quintin	Urban	738	5.2	0	260	260	127	31	24.4	180	298
		Rural	3,968	5.0	0	1,665	1,665	723	249	34.4	1,367	936
		Total	4,706	5.0	0	1,925	1,925	850	280	32.9	1,547	1,234
045224	Tayum	Urban	2,268	5.1	1,500	50	1,550	430	4	0.9	21	697
		Rural	9,569	5.7	520	2,227	2,747	1,563	37	2.4	227	6,595
		Total	11,837	5.5	2,020	2,277	4,297	1,993	41	2.1	248	7,292
045225	Tineg	Urban	0	0.0	0	0	0	0	0	0.0	0	0
		Rural	3,109	5.4	0	1,215	1,215	570	361	63.3	1,894	0
		Total	3,109	5.4	0	1,215	1,215	570	361	63.3	1,894	0
045226	Tubo	Urban	0	0.0	0	0	0	0	0	0.0	0	0
		Rural	5,111	5.5	1,215	1,814	3,029	829	42	5.1	259	1,823
		Total	5,111	5.5	1,215	1,814	3,029	829	42	5.1	259	1,823
045227	Villavieja	Urban	788	5.2	0	520	520	146	6	4.1	32	236
		Rural	4,209	5.3	0	2,582	2,582	728	53	7.3	306	1,321
		Total	4,997	5.3	0	3,102	3,102	874	59	6.8	338	1,557
Provincial Total		Urban	47,471	5.3	17,798	6,749	24,547	8,339	302	3.6	1,701	21,223
		Rural	151,808	5.4	13,505	33,773	47,278	25,996	3,025	11.6	17,079	87,451
		Total	199,279	5.4	31,303	40,522	71,825	34,335	3,327	9.7	18,780	108,674

Table 4.1.5 Estimation of Population Covered by Safe and Unsafe Source by Municipality

Sheet 1

NEDA Geo- graphic Code	Municipality	Type	Pop. Covered by Level I Facilities	Number of Facilities			Coverage of Own Use					
				Public Facilities		Private Facilities		Number of Private Facilities		(1) Population Covered		
				Safe	Unsafe	Total	Safe	Unsafe	Total	Safe	Unsafe	Total
045201	Bangued (Capital)	Urban	4,494	30	10	40	138	0	138	69	0	69
		Rural	14,686	92	13	105	189	0	189	95	0	95
		Total	19,180	122	23	145	327	0	327	164	0	164
045202	Boliney	Urban	19	0	0	0	0	0	0	0	0	0
		Rural	532	0	0	0	0	0	0	0	0	0
		Total	551	0	0	0	0	0	0	0	0	0
045203	Bucay	Urban	1,545	6	1	7	24	0	24	12	0	12
		Rural	5,314	11	4	15	64	0	64	32	0	32
		Total	6,859	17	5	22	88	0	88	44	0	44
045204	Bucloc	Urban	0	0	0	0	0	0	0	0	0	0
		Rural	1,112	0	3	3	0	0	0	0	0	0
		Total	1,112	0	3	3	0	0	0	0	0	0
045205	Daguioman	Urban	0	0	0	0	0	0	0	0	0	0
		Rural	890	0	0	0	0	0	0	0	0	0
		Total	890	0	0	0	0	0	0	0	0	0
045206	Danglas	Urban	1,157	3	0	3	40	0	40	20	0	20
		Rural	641	10	0	10	23	0	23	12	0	12
		Total	1,798	13	0	13	63	0	63	32	0	32
045207	Dolores	Urban	595	4	0	4	10	0	10	5	0	5
		Rural	6,501	62	1	63	213	0	213	107	0	107
		Total	7,096	66	1	67	223	0	223	112	0	112
045208	Lacub	Urban	282	0	0	0	0	0	0	0	0	0
		Rural	764	1	1	2	0	0	0	0	0	0
		Total	1,046	1	1	2	0	0	0	0	0	0
045209	Lagangilang	Urban	1,206	5	0	5	0	0	0	0	0	0
		Rural	7,125	86	9	95	24	0	24	12	0	12
		Total	8,331	91	9	100	24	0	24	12	0	12



Table 4.1.5 Estimation of Population Covered by Safe and Unsafe Source by Municipality (Cont'd.)

Sheet 1

NEDA Geo- graphic Code	Municipality	Type	Pop. Covered by Level I Facilities	Number of Facilities			Coverage of Own Use					
				Public Facilities		Private Facilities		Number of Private Facilities		(1) Population Covered		Total
				Safe	Unsafe	Total	Safe	Unsafe	Total	Safe	Unsafe	
045210	Lagayan	Urban	691	4	1	5	4	0	4	2	11	11
		Rural	866	2	0	2	2	10	12	6	5	32
		Total	1,557	6	1	7	6	10	16	8	16	43
045211	Langiden	Urban	220	1	0	1	5	0	5	3	12	0
		Rural	1,894	3	0	3	9	0	9	5	22	22
		Total	2,114	4	0	4	14	0	14	8	34	22
045212	Ila Paz	Urban	3,089	29	0	29	89	0	89	45	236	236
		Rural	6,835	18	0	18	137	0	137	69	343	343
		Total	9,924	47	0	47	226	0	226	114	579	579
045213	Licuan	Urban	41	0	2	2	0	0	0	0	0	0
		Rural	948	0	8	8	0	0	0	0	0	0
		Total	989	0	10	10	0	0	0	0	0	0
045214	Luba	Urban	196	0	0	0	0	0	0	0	0	0
		Rural	2,762	0	0	0	0	0	0	0	0	0
		Total	2,958	0	0	0	0	0	0	0	0	0
045215	Malibcong	Urban	0	0	0	0	0	0	0	0	0	0
		Rural	151	0	5	5	0	0	0	0	0	0
		Total	151	0	5	5	0	0	0	0	0	0
045216	Manabo	Urban	2,755	19	8	27	108	0	108	54	281	281
		Rural	2,165	13	5	18	52	0	52	26	133	133
		Total	4,920	32	13	45	160	0	160	80	414	414
045217	Penarrubia	Urban	0	0	0	0	0	0	0	0	0	0
		Rural	1,779	6	1	7	0	0	0	0	0	0
		Total	1,779	6	1	7	0	0	0	0	0	0
045218	Pidigan	Urban	1,638	4	0	4	15	0	15	8	42	42
		Rural	6,070	27	3	30	30	0	30	15	83	83
		Total	7,708	31	3	34	45	0	45	23	125	125

Table 4.1.5 Estimation of Population Covered by Safe and Unsafe Source by Municipality (Cont'd.)

Sheet 1

NEDA Geo- graphic Code	Municipality	Type	Pop. Covered by Level I Facilities	Number of Facilities			Number of Private Facilities			Coverage of Own Use		
				Public Facilities			Private Facilities			(1) Population Covered		
				Safe	Unsafe	Total	Safe	Unsafe	Total	Safe	Unsafe	Total
045219	Pilar	Urban	0	7	0	7	10	0	10	5	0	5
		Rural	4,469	54	13	67	6	2	8	4	16	20
		Total	4,469	61	13	74	16	2	18	9	16	25
045220	Sal-lapadan	Urban	704	0	0	0	0	0	0	0	0	0
		Rural	1,278	0	0	0	0	0	0	0	0	0
		Total	2,042	0	0	0	0	0	0	0	0	0
045221	San Isidro	Urban	285	12	0	12	12	0	12	6	37	49
		Rural	3,043	11	3	14	33	0	33	17	91	108
		Total	3,328	23	3	26	45	0	45	23	128	151
045222	San Juan	Urban	1,015	4	0	4	18	4	22	9	2	11
		Rural	6,951	65	13	78	138	38	176	69	19	88
		Total	7,966	69	13	82	156	42	198	78	21	99
045223	San Quinon	Urban	298	0	0	0	0	0	0	0	0	0
		Rural	936	8	1	9	20	0	20	10	0	10
		Total	1,234	8	1	9	20	0	20	10	0	10
045224	Tayum	Urban	697	16	3	19	14	0	14	7	0	7
		Rural	6,595	28	12	40	43	0	43	22	0	22
		Total	7,292	44	15	59	57	0	57	29	0	29
045225	Tineg	Urban	0	0	0	0	0	0	0	0	0	0
		Rural	0	0	4	4	0	0	0	0	0	0
		Total	0	0	4	4	0	0	0	0	0	0
045226	Tubo	Urban	0	0	0	0	0	0	0	0	0	0
		Rural	1,823	0	5	5	0	0	0	0	0	0
		Total	1,823	0	5	5	0	0	0	0	0	0
045227	Villaviecosa	Urban	236	1	0	1	10	0	10	5	0	5
		Rural	1,321	26	5	31	14	0	14	7	0	7
		Total	1,557	27	5	32	24	0	24	12	0	12
Provincial Total		Urban	21,223	145	25	170	497	4	501	250	2	252
		Rural	87,451	523	109	632	997	50	1,047	502	25	527
		Total	108,674	668	134	802	1,494	54	1,548	752	27	779

Table 4.1.5 Estimation of Population Covered by Safe and Unsafe Source by Municipality

Sheet 2

NEDA Geo- graphic Code	Municipality	Type	Pop. Covered by Level I Facilities	Coverage of Shared Use						Level I Coverage (1) + (2)						
				(2) Population Covered by Public and Private			Number of Households			No. of HHs per Shared Facility	Safe		Unsafe		Total	
				Safe	Unsafe	Total	Safe	Unsafe	Total		Pop.	%	Pop.	%		
045201	Bangued (Capital)	Urban	4,494	3,749	579	4,128	707	72	779	7	4,115	28	379	3	4,494	30
		Rural	14,686	13,252	924	14,176	2,454	171	2,625	13	13,762	61	924	4	14,686	65
		Total	19,180	17,001	1,303	18,304	3,161	243	3,404	11	17,877	48	1,303	3	19,180	51
045202	Boliney	Urban	19	0	19	19	0	3	3	0	0	0	19	2	19	2
		Rural	532	0	532	532	0	99	99	0	0	0	532	16	532	16
		Total	551	0	551	551	0	102	102	0	0	0	551	13	551	13
045203	Bucay	Urban	1,545	1,402	78	1,480	260	14	274	14	1,467	53	78	3	1,545	56
		Rural	5,314	4,698	437	5,135	839	78	917	20	4,877	44	437	4	5,314	48
		Total	6,859	6,100	515	6,615	1,099	92	1,191	18	6,344	46	515	4	6,859	49
045204	Bucloc	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	1,112	0	1,112	1,112	0	199	199	66	0	0	1,112	52	1,112	52
		Total	1,112	0	1,112	1,112	0	199	199	66	0	0	1,112	52	1,112	52
045205	Daguio	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	890	0	890	890	0	168	168	0	0	0	890	59	890	59
		Total	890	0	890	890	0	168	168	0	0	0	890	59	890	59
045206	Danglas	Urban	1,157	1,055	0	1,055	207	0	207	9	1,157	74	0	0	1,157	74
		Rural	641	582	0	582	114	0	114	5	641	38	0	0	641	38
		Total	1,798	1,637	0	1,637	321	0	321	7	1,798	55	0	0	1,798	55
045207	Dolores	Urban	595	570	0	570	114	0	114	13	595	32	0	0	595	32
		Rural	6,501	5,880	35	5,915	1,069	6	1,075	6	6,466	87	35	0	6,501	88
		Total	7,096	6,450	35	6,485	1,183	6	1,189	7	7,061	76	35	0	7,096	77
045208	Lacub	Urban	282	0	282	282	0	51	51	0	0	0	282	42	282	42
		Rural	764	382	382	764	68	68	136	68	382	21	382	21	764	42
		Total	1,046	382	664	1,046	68	119	187	94	382	15	664	27	1,046	42
045209	Lagangilang	Urban	1,206	1,206	0	1,206	228	0	228	46	1,206	48	0	0	1,206	48
		Rural	7,125	6,464	594	7,058	1,154	106	1,260	12	6,531	67	594	6	7,125	73
		Total	8,331	7,670	594	8,264	1,382	106	1,488	13	7,737	63	594	5	8,331	68

Table 4.1.5 Estimation of Population Covered by Safe and Unsafe Source by Municipality (Cont'd.)

Sheet 2

NEDA Geo- graphic Code	Municipality	Type	Pop. Covered by Level I Facilities	Coverage of Shared Use						Level I Coverage (1) + (2)						
				(2) Population Covered by Public and Private			Number of Households			No. of HHs per Shared Facility	Safe		Unsafe		Total	
				Safe	Unsafe	Total	Safe	Unsafe	Total		Pop.	%	Pop.	%		
045210	Lagayan	Urban	691	583	97	680	110	18	128	18	594	70	97	11	691	81
		Rural	866	313	521	834	59	98	157	20	318	12	548	21	866	34
		Total	1,557	896	618	1,514	169	116	285	19	912	27	645	19	1,557	45
045211	Langiden	Urban	220	208	0	208	44	0	44	13	220	63	0	0	220	63
		Rural	1,894	1,872	0	1,872	382	0	382	51	1,894	86	0	0	1,894	86
		Total	2,114	2,080	0	2,080	426	0	426	39	2,114	83	0	0	2,114	83
045212	La Paz	Urban	3,089	2,853	0	2,853	538	0	538	7	3,089	92	0	0	3,089	92
		Rural	6,835	6,492	0	6,492	1,298	0	1,298	15	6,835	75	0	0	6,835	75
		Total	9,924	9,345	0	9,345	1,836	0	1,836	11	9,924	80	0	0	9,924	80
045213	Licuan	Urban	41	0	41	41	0	8	8	4	0	0	41	6	41	6
		Rural	948	0	948	948	0	161	161	20	0	0	948	28	948	28
		Total	989	0	989	989	0	169	169	17	0	0	989	24	989	24
045214	Luba	Urban	196	0	196	196	0	34	34	0	0	0	196	17	196	17
		Rural	2,762	0	2,762	2,762	0	511	511	0	0	0	2,762	58	2,762	58
		Total	2,958	0	2,958	2,958	0	545	545	0	0	0	2,958	50	2,958	50
045215	Malibcong	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	151	0	151	151	0	26	26	5	0	0	151	4	151	4
		Total	151	0	151	151	0	26	26	5	0	0	151	4	151	4
045216	Manabo	Urban	2,755	2,230	244	2,474	429	47	476	6	2,511	63	244	6	2,755	69
		Rural	2,165	1,801	231	2,032	353	45	398	9	1,934	43	231	5	2,165	48
		Total	4,920	4,031	475	4,506	782	92	874	7	4,445	52	475	6	4,920	58
045217	Penarrubia	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	1,779	1,525	254	1,779	272	45	317	45	1,525	35	254	6	1,779	41
		Total	1,779	1,525	254	1,779	272	45	317	45	1,525	29	254	5	1,779	33
045218	Pidigan	Urban	1,638	1,596	0	1,596	285	0	285	25	1,638	62	0	0	1,638	62
		Rural	6,070	5,588	399	5,987	1,016	73	1,089	24	5,671	80	399	6	6,070	85
		Total	7,708	7,184	399	7,583	1,301	73	1,374	24	7,309	75	399	4	7,708	79

Table 4.1.5 Estimation of Population Covered by Safe and Unsafe Source by Municipality (Cont'd.)

Sheet 2

NEDA Geo- graphic Code	Municipality	Type	Pop. Covered by Level I Facilities	Coverage of Shared Use						Level I Coverage (1) + (2)					
				(2) Population Covered by Public and Private			Number of Households			No. of HHs per Shared Facility	Safe		Unsafe		Total
				Safe	Unsafe	Total	Safe	Unsafe	Total		Pop.	%	Pop.	%	Pop.
045219	Pilar	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	4,469	3,571	877	4,448	674	165	839	12	3,587	47	882	12	4,469
		Total	4,469	3,571	877	4,448	674	165	839	10	3,587	40	882	10	4,469
045220	Sal-lapadan	Urban	764	0	764	764	0	139	139	0	0	0	764	54	764
		Rural	1,278	0	1,278	1,278	0	232	232	0	0	0	1,278	33	1,278
		Total	2,042	0	2,042	2,042	0	371	371	0	0	0	2,042	38	2,042
045221	San Isidro	Urban	285	248	0	248	41	0	41	2	285	52	0	0	285
		Rural	3,043	2,652	290	2,952	484	53	537	18	2,753	77	290	8	3,043
		Total	3,328	2,910	290	3,200	525	53	578	12	3,038	74	290	7	3,328
045222	San Juan	Urban	1,015	834	128	962	174	27	201	13	877	66	138	10	1,015
		Rural	6,951	5,256	1,255	6,511	1,051	251	1,302	8	5,601	72	1,350	17	6,951
		Total	7,966	6,090	1,383	7,473	1,225	278	1,503	8	6,478	71	1,488	16	7,966
045223	San Quintin	Urban	298	0	298	298	0	57	57	0	0	0	298	40	298
		Rural	936	839	47	886	168	9	177	9	889	22	47	1	936
		Total	1,234	839	345	1,184	168	66	234	12	889	19	345	7	1,234
045224	Tayum	Urban	697	585	76	661	115	15	130	5	621	27	76	3	697
		Rural	6,595	5,209	1,263	6,472	914	222	1,136	18	5,332	56	1,263	13	6,595
		Total	7,292	5,794	1,339	7,133	1,029	237	1,266	14	5,953	50	1,339	11	7,292
045225	Tineg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0
045226	Tubo	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	1,823	0	1,823	1,823	0	331	331	66	0	0	1,823	36	1,823
		Total	1,823	0	1,823	1,823	0	331	331	66	0	0	1,823	36	1,823
045227	Villavieja	Urban	236	210	0	210	40	0	40	7	236	30	0	0	236
		Rural	1,321	1,115	169	1,284	210	32	242	6	1,152	27	169	4	1,321
		Total	1,557	1,325	169	1,494	250	32	282	6	1,388	28	169	3	1,557
Provincial Total		Urban	21,223	17,329	2,602	19,931	3,292	485	3,777	9	18,611	39	2,612	6	21,223
		Rural	87,451	67,501	17,174	84,675	12,579	3,149	15,728	14	70,150	46	17,301	11	87,451
		Total	108,674	84,830	19,776	104,606	15,871	3,634	19,505	12	88,761	45	19,913	10	108,674

4.2 Sanitation and Sewerage  
 4.2.2 Types of Facilities and Definition of Service Level Standard

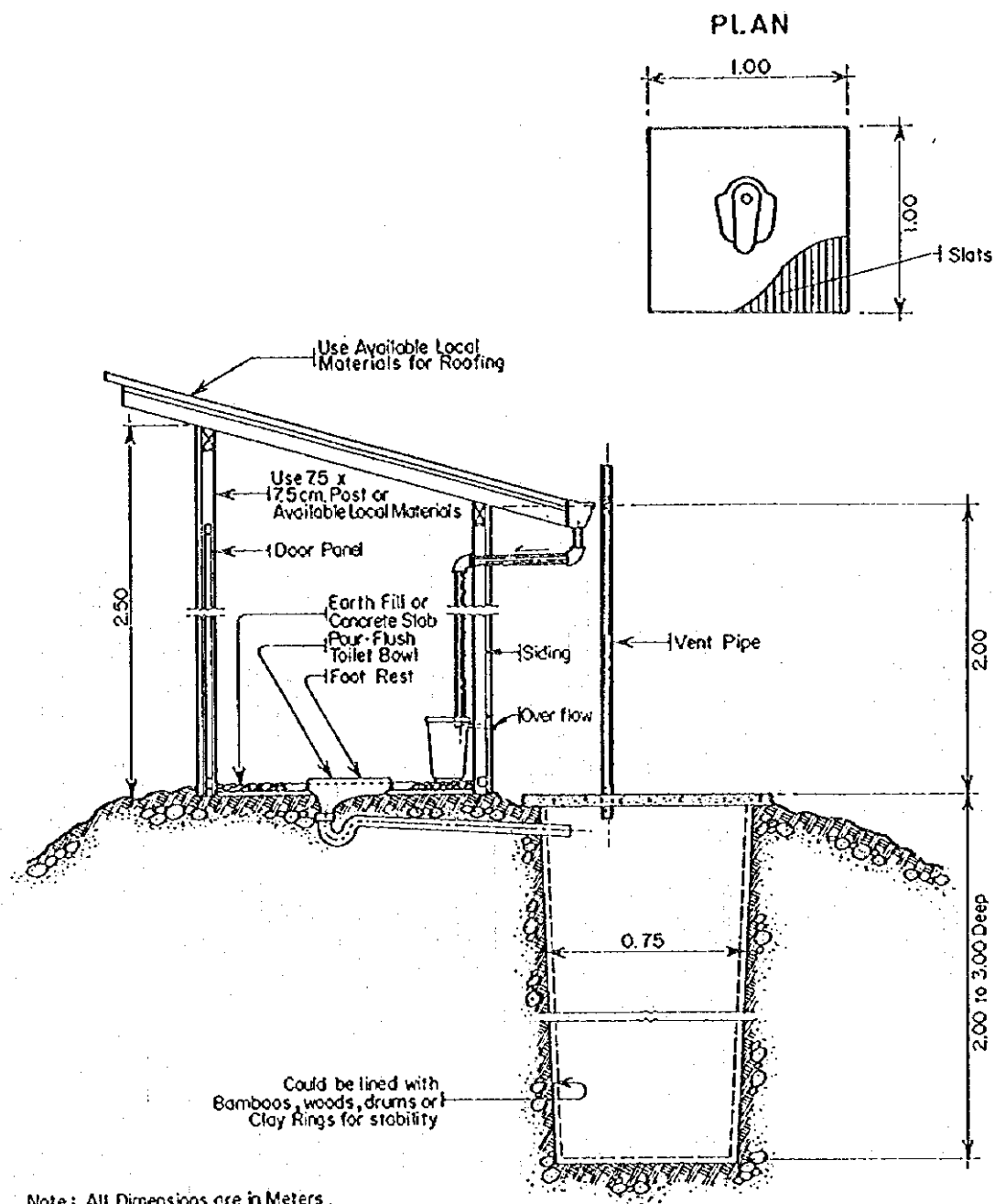
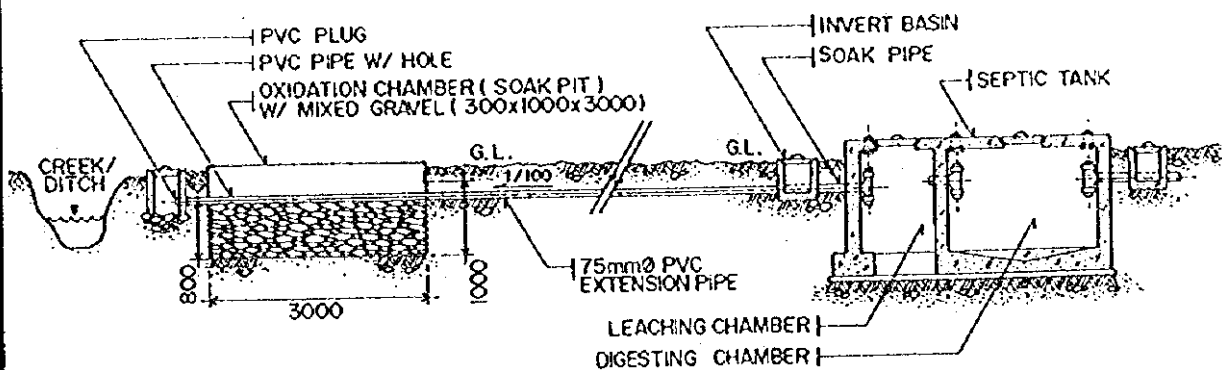


FIGURE 4.2.1  
 STANDARD STRUCTURE OF PRIVATE TOILET FACILITY



LAYOUT PLAN OF HIGH GROUND WATER SITE

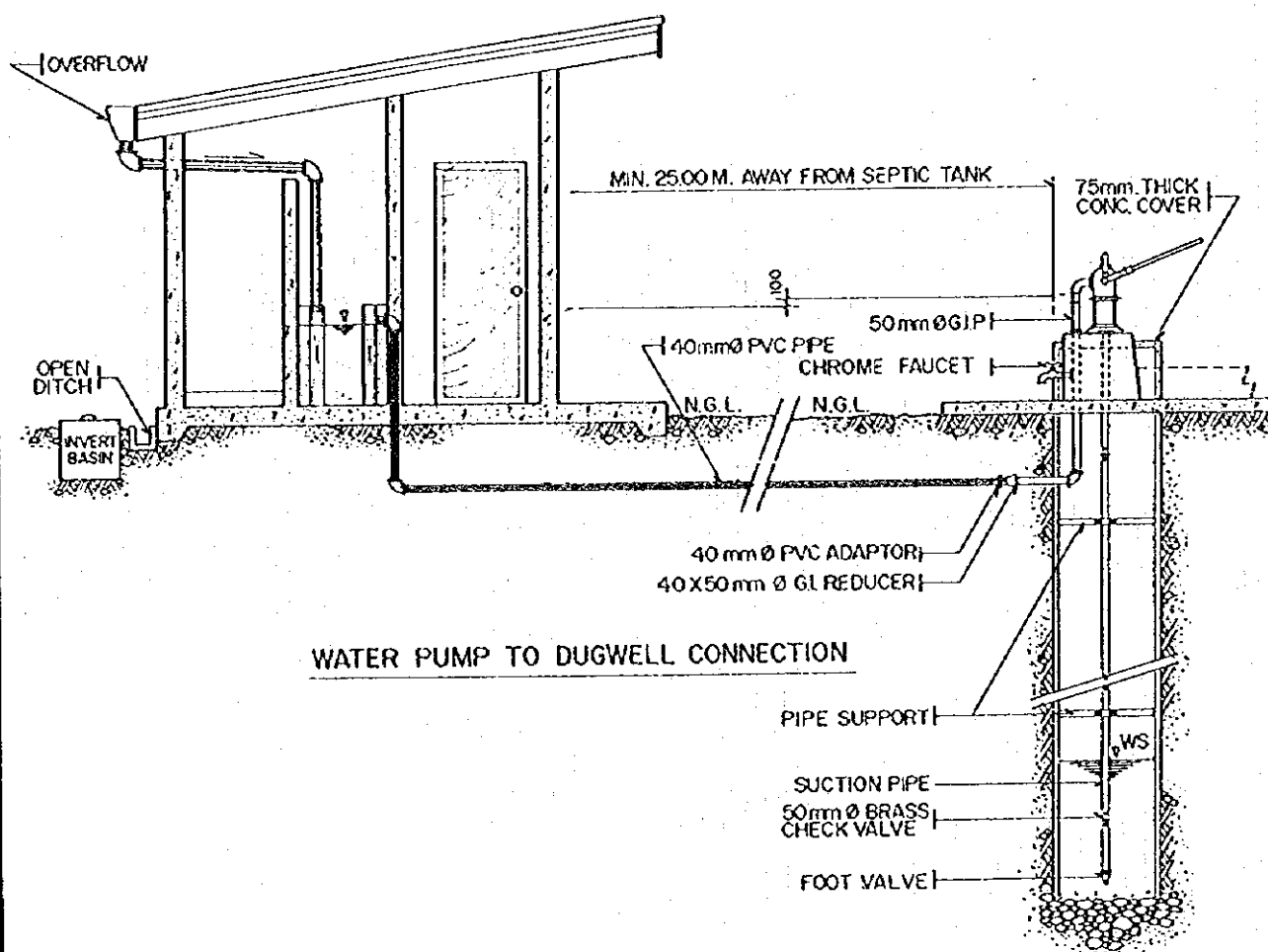


FIGURE 4.2.2  
STANDARD STRUCTURE OF SCHOOL TOILET FACILITY

#### 4.2.3 Sanitation Facilities and Service Coverage

Table 4.2.1 Sanitation Facilities and Service Coverage of Household Toilets by Type, by Municipality, Urban and Rural, 1995

Municipality	Type	HHs No. 1995	Households Served by Sanitary Toilets								Underserved/Unserved HHs			
			Flush		Pour Flush		VIP		Total		Unsanitary		No Facility	
			Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Bagoed (Capital)	Urban	2,816	556	20	1,879	67	0	0	2,435	87	371	13	10	0
	Rural	4,152	5	0	147	4	0	0	152	4	3,893	94	107	2
	Total	6,968	561	8	2,026	29	0	0	2,587	37	4,264	61	117	2
Boliney	Urban	139	7	5	13	9	0	0	20	14	0	0	119	86
	Rural	630	2	0	93	15	0	0	95	15	104	17	431	68
	Total	769	9	1	106	14	0	0	115	15	104	14	550	71
Bucay	Urban	511	16	3	187	37	0	0	203	40	302	59	6	1
	Rural	1,966	0	0	661	34	30	2	691	36	914	46	361	18
	Total	2,477	16	1	848	34	30	1	894	36	1,216	49	367	15
Bucke	Urban	0	0	0	0	0	0	0	0	0	0	0	0	100
	Rural	379	5	1	100	26	30	8	135	35	20	5	224	60
	Total	379	5	1	100	26	30	8	135	35	20	5	224	60
Daguio	Urban	0	0	0	0	0	0	0	0	0	0	0	0	100
	Rural	284	5	2	58	20	33	12	96	34	96	34	92	32
	Total	284	5	2	58	20	33	12	96	34	96	34	92	32
Danglas	Urban	302	3	1	198	66	10	3	211	70	90	30	1	0
	Rural	334	6	2	88	26	90	27	184	55	147	44	3	1
	Total	636	9	1	286	45	100	16	395	62	237	37	4	1
Dolores	Urban	375	19	5	210	56	3	1	232	62	120	32	23	6
	Rural	1,346	9	1	603	45	9	1	621	47	472	35	253	18
	Total	1,721	28	2	813	47	12	1	853	50	592	34	276	16
Lacub	Urban	123	3	2	120	98	0	0	123	100	0	0	0	0
	Rural	326	0	0	206	63	0	0	206	63	61	19	59	18
	Total	449	3	1	326	73	0	0	329	74	61	14	59	12
Lagangilang	Urban	467	48	10	259	55	0	0	307	65	136	29	24	6
	Rural	1,747	6	0	842	48	0	0	848	48	730	42	169	10
	Total	2,214	54	2	1,101	50	0	0	1,155	52	866	39	193	9
Lagayan	Urban	161	3	2	95	59	6	4	104	65	55	34	2	1
	Rural	485	1	0	263	54	21	4	285	58	158	33	42	9
	Total	646	4	1	358	55	27	4	389	60	213	33	44	7
Langiden	Urban	74	5	7	56	76	0	0	61	83	13	18	0	0
	Rural	454	2	0	205	45	0	0	207	45	238	52	9	3
	Total	528	7	1	261	49	0	0	268	50	251	48	9	2
La Paz	Urban	638	19	3	605	95	0	0	624	98	14	2	0	0
	Rural	1,799	6	0	896	50	33	2	935	52	771	43	93	5
	Total	2,437	25	1	1,501	62	33	1	1,559	64	785	32	93	4
Licuan	Urban	121	7	6	100	83	0	0	107	89	2	2	12	9
	Rural	576	3	1	374	65	4	1	381	67	101	18	94	15
	Total	697	10	1	474	68	4	1	488	70	103	15	106	15
Luba	Urban	202	6	3	166	82	2	1	174	86	23	11	5	3
	Rural	856	4	0	360	41	129	15	493	56	317	36	76	8
	Total	1,058	10	1	526	48	131	12	667	61	340	31	81	8



Table 4.2.1 Sanitation Facilities and Service Coverage of Household Toilets by Type, by Municipality, Urban and Rural, 1995 (Cont'd.)

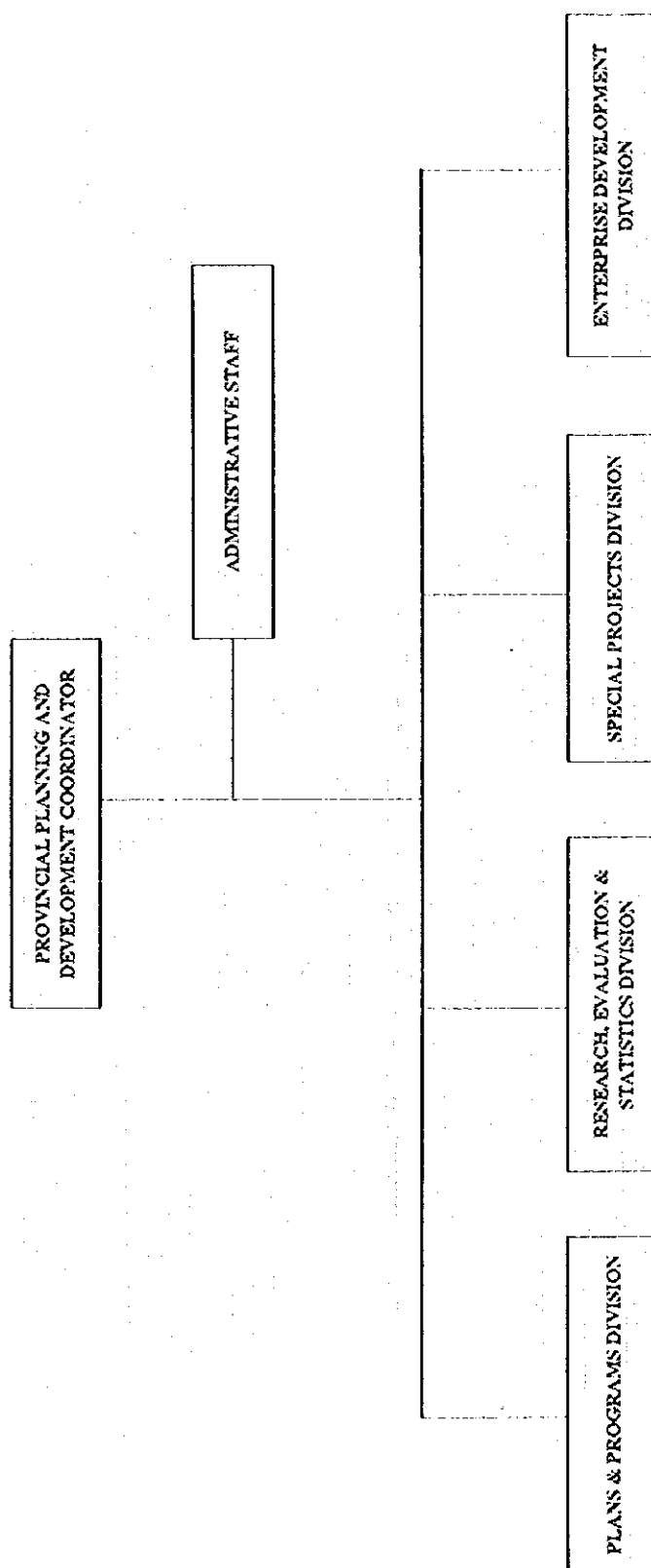
Municipality	Type	HHs No. 1995	Households Served by Sanitary Toilets								Underserved/Unserved HHs			
			Flush		Pour Flush		VIP		Total		Unsanitary		No Facility	
			Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Malibcong	Urban	0	0	0	0	0	0	0	0	0	0	0	0	100
	Rural	632	34	5	188	30	148	23	370	58	131	21	131	21
	Total	632	34	5	188	30	148	23	370	58	131	21	131	21
Manabo	Urban	757	9	1	418	55	0	0	427	56	238	31	92	13
	Rural	891	5	1	512	57	4	0	521	58	301	34	69	8
	Total	1,648	14	1	930	56	4	0	948	57	539	33	161	10
Penarrubia	Urban	191	120	63	41	21	25	13	186	97	5	3	0	0
	Rural	767	237	31	175	23	345	45	757	99	10	1	0	0
	Total	958	357	37	216	23	370	39	943	99	15	2	0	-1
Pidigan	Urban	476	63	13	363	76	0	0	426	89	21	4	29	7
	Rural	1,302	0	0	970	75	0	0	970	75	178	14	154	11
	Total	1,778	63	4	1,333	75	0	0	1,396	79	199	11	183	10
Pilar	Urban	236	16	7	83	35	0	0	99	42	97	41	40	17
	Rural	1,442	5	0	606	42	0	0	611	42	576	40	255	18
	Total	1,678	21	1	689	41	0	0	710	42	673	40	295	18
Sal-lapadan	Urban	261	6	2	102	39	0	0	108	41	116	41	37	15
	Rural	710	0	0	479	67	99	14	578	81	132	19	0	0
	Total	971	6	1	581	60	99	10	686	71	248	26	37	3
San Isidro	Urban	91	2	2	75	82	0	0	77	84	14	15	0	1
	Rural	652	0	0	411	63	0	0	411	63	227	35	14	2
	Total	743	2	0	486	65	0	0	488	65	241	32	14	3
San Juan	Urban	278	18	6	205	74	0	0	223	80	40	14	15	6
	Rural	1,544	14	1	523	34	0	0	537	35	915	59	92	6
	Total	1,822	32	2	728	40	0	0	760	42	955	52	107	6
San Quintin	Urban	143	7	5	62	43	34	24	103	72	40	28	0	0
	Rural	789	5	1	178	23	302	38	485	62	299	38	5	0
	Total	932	12	1	240	26	336	36	588	63	339	36	5	1
Tayum	Urban	449	51	11	290	65	0	0	341	76	108	24	0	0
	Rural	1,686	117	7	1,085	64	0	0	1,202	71	434	26	50	3
	Total	2,135	168	8	1,375	64	0	0	1,543	72	542	25	50	3
Tineg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	100
	Rural	578	14	2	158	27	34	6	206	35	236	41	136	24
	Total	578	14	2	158	27	34	6	206	35	236	41	136	24
Tubo	Urban	0	0	0	0	0	0	0	0	0	0	0	0	100
	Rural	923	2	0	213	23	39	4	254	27	183	20	486	53
	Total	923	2	0	213	23	39	4	254	27	183	20	486	53
Villaviciosa	Urban	151	13	9	93	62	0	0	106	71	45	30	0	-1
	Rural	796	2	0	474	60	0	0	476	60	285	36	35	4
	Total	947	15	2	567	60	0	0	582	62	330	35	35	3
Provincial Total	Urban	8,962	997	11	5,620	63	80	1	6,697	75	1,850	21	415	4
	Rural	28,076	489	2	10,868	39	1,350	5	12,707	45	11,929	43	3,440	13
	Total	37,038	1,486	4	16,488	45	1,430	4	19,404	52	13,779	37	3,855	11



## 5. EXISTING SECTOR ARRANGEMENTS AND INSTITUTIONAL CAPACITY

### 5.5 Sector Agencies at the Local Level

**FIGURE 5.5.1**  
**ORGANIZATIONAL CHART**  
**PROVINCIAL PLANNING & DEVELOPMENT OFFICE**  
**PROVINCE OF ABRA**



**FIGURE 5.5.2**  
**ORGANIZATIONAL CHART**  
**PROVINCIAL ENGINEER'S OFFICE**  
**PROVINCE OF ABRA**

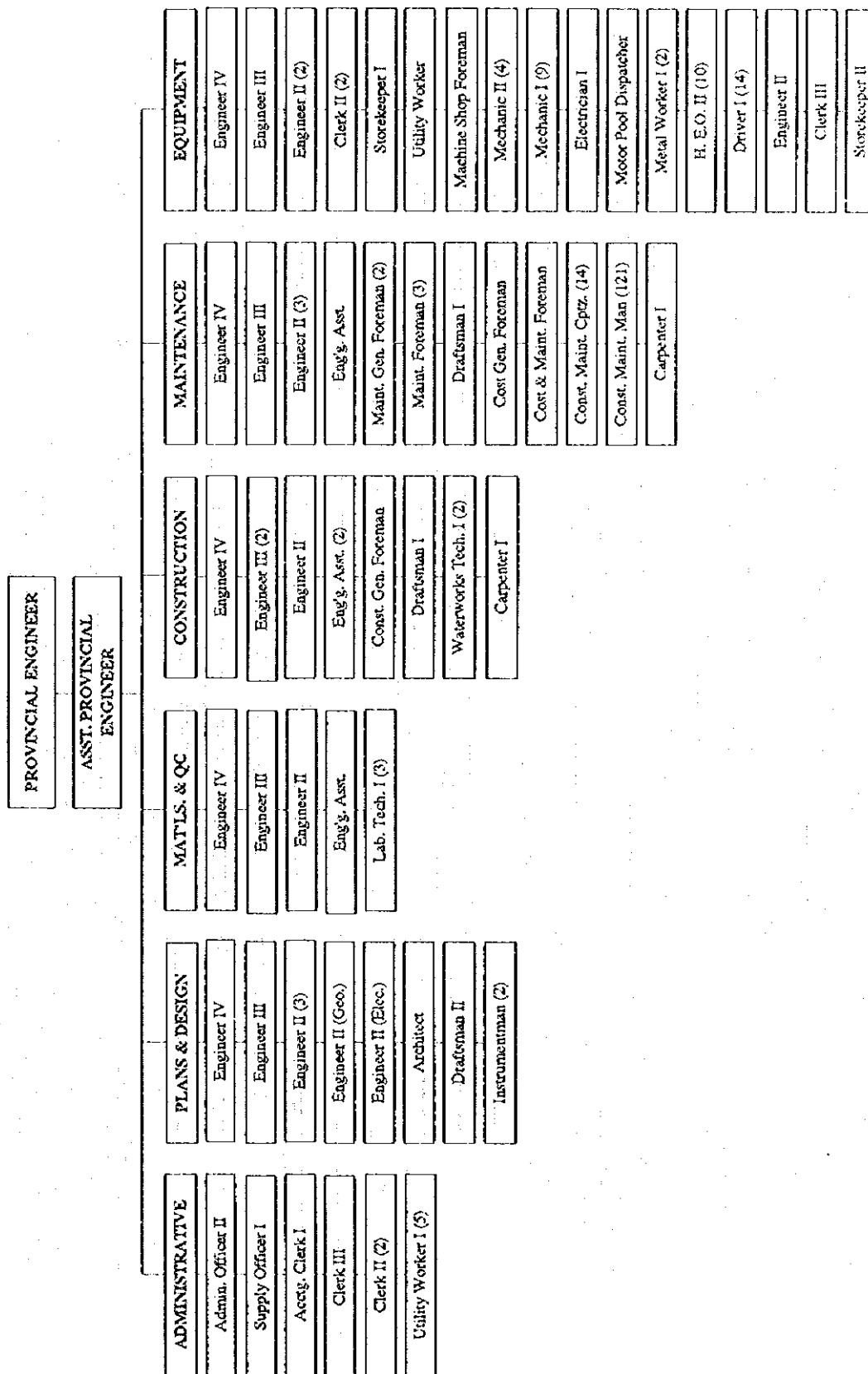
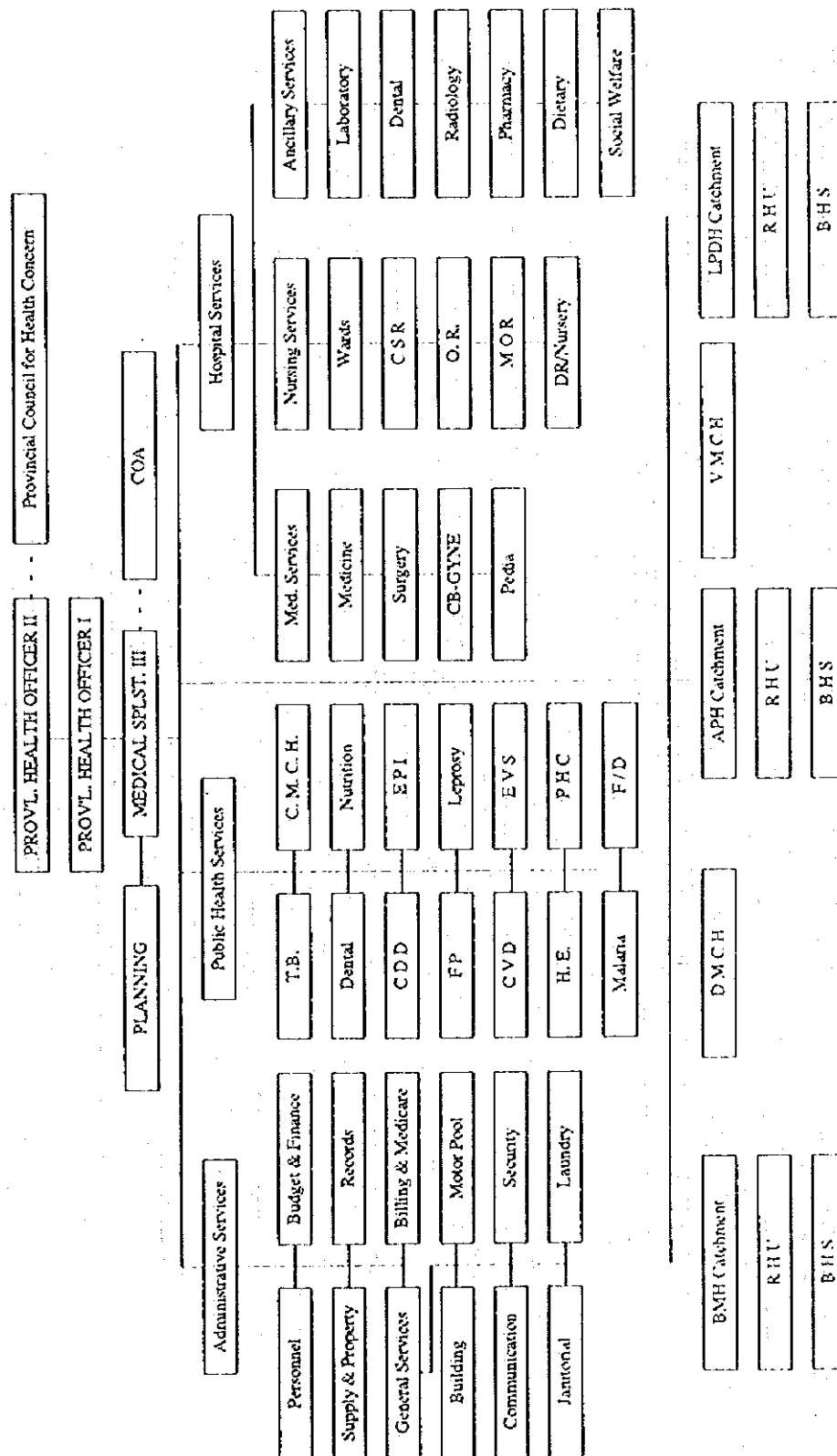


FIGURE 5.53  
ORGANIZATIONAL CHART  
PROVINCIAL HEALTH OFFICE  
PROVINCE OF ABRA





**6. PAST FINANCIAL PERFORMANCE IN WATER SUPPLY AND SANITATION**  
**6.2 Past Public Investment**

**Table 6.2.1 Past Internal Revenue Allotment to Municipalities in Abra Province in 1990-94**

Unit: Pesos

	1990	1991	1992	1993	1994
<b>I. IRA to All Municipalities (National Total)</b>	<b>3,054,601,475</b>	<b>4,046,837,742</b>	<b>7,127,522,550</b>	<b>12,484,800,000</b>	<b>16,325,288,074</b>
<b>II IRA to Municipalities</b>					
<i>Total</i>	22,993,573	29,601,777	71,788,081	122,629,598	160,050,056
1. Bangued	2,041,001	2,611,993	4,374,125	7,666,091	10,311,495
2. Boliney	670,124	883,023	2,341,432	4,022,950	5,166,973
3. Bucay	1,169,938	1,436,300	3,012,629	5,179,298	6,888,274
4. Bucloc	394,868	518,916	1,745,065	2,828,706	3,795,959
5. Daguioman	481,538	631,138	1,967,426	3,323,402	4,255,376
6. Danglas	716,373	935,323	2,535,413	4,329,918	5,592,070
7. Dolores	710,882	887,512	2,150,525	3,548,723	4,916,179
8. La Paz	884,216	1,158,428	2,619,820	4,386,133	5,898,528
9. Lacub	924,356	1,222,830	3,200,073	5,586,529	6,960,910
10. Lagangilang	877,631	1,128,011	2,504,321	4,232,728	5,722,705
11. Lagayan	628,251	779,549	2,134,687	3,626,628	4,747,040
12. Langiden	559,726	718,458	2,111,363	3,505,777	4,638,089
13. Licuan-Baay	961,928	1,261,529	3,148,695	5,452,721	6,850,543
14. Luba	796,228	1,016,362	2,489,648	4,273,871	5,575,218
15. Malibcong	1,054,454	1,378,337	3,424,742	5,968,933	7,403,321
16. Manabo	737,673	955,493	2,355,405	3,939,741	5,248,449
17. Penarrubia	511,245	663,039	1,902,824	3,078,498	4,261,014
18. Pidigan	714,706	934,842	2,220,043	3,728,878	5,079,492
19. Pilar	827,010	1,041,723	2,459,332	4,158,862	5,597,223
20. Sal-Lapadan	640,868	822,672	2,192,686	3,652,948	4,782,169
21. San Isidro	459,068	591,866	1,769,582	2,910,403	4,004,176
22. San Juan	758,682	973,077	2,299,728	3,934,121	5,346,166
23. San Quintin	545,975	714,913	1,996,156	3,350,765	4,492,377
24. Tayum	829,903	1,046,762	2,325,900	3,941,371	5,303,570
25. Tineg	2,094,606	2,739,745	6,215,172	11,182,204	13,442,532
26. Tubo	1,392,489	1,760,353	4,139,159	7,301,592	8,955,321
27. Villaviciosa	609,834	789,583	2,152,130	3,587,807	4,814,887
<b>III Shares (%) in national total</b>					
<i>Total</i>	0.753	0.731	1.007	0.983	0.980
1. Bangued	0.067	0.065	0.061	0.061	0.063
2. Boliney	0.022	0.022	0.033	0.032	0.032
3. Bucay	0.038	0.035	0.042	0.041	0.042
4. Bucloc	0.013	0.013	0.024	0.023	0.023
5. Daguioman	0.016	0.016	0.028	0.027	0.026
6. Danglas	0.023	0.023	0.036	0.035	0.034
7. Dolores	0.023	0.022	0.030	0.028	0.030
8. La Paz	0.029	0.029	0.037	0.035	0.036
9. Lacub	0.030	0.030	0.045	0.045	0.043
10. Lagangilang	0.029	0.028	0.035	0.034	0.035
11. Lagayan	0.021	0.019	0.030	0.029	0.029
12. Langiden	0.018	0.018	0.030	0.028	0.028
13. Licuan-Baay	0.031	0.031	0.041	0.041	0.042
14. Luba	0.026	0.025	0.035	0.034	0.034
15. Malibcong	0.035	0.034	0.048	0.048	0.045
16. Manabo	0.024	0.024	0.033	0.032	0.032
17. Penarrubia	0.017	0.016	0.027	0.025	0.026
18. Pidigan	0.023	0.023	0.031	0.030	0.031
19. Pilar	0.027	0.026	0.035	0.033	0.034
20. Sal-Lapadan	0.021	0.020	0.031	0.029	0.029
21. San Isidro	0.015	0.015	0.025	0.023	0.025
22. San Juan	0.025	0.024	0.032	0.032	0.033
23. San Quintin	0.018	0.018	0.028	0.027	0.028
24. Tayum	0.027	0.026	0.033	0.032	0.032
25. Tineg	0.069	0.068	0.087	0.090	0.082
26. Tubo	0.046	0.043	0.058	0.058	0.055
27. Villaviciosa	0.020	0.020	0.030	0.029	0.029

Sources: (1) Department of Budget and Management and (2) Bureau of Local Government Finance (DOF)





## **7. WATER SOURCE DEVELOPMENT**

### **7.3 Groundwater Sources**

#### **7.3.2 Groundwater Availability in the Province**

##### **(1) Major Information and References**

The Groundwater Availability Map was prepared using the following information and references (detailed list of references is presented in Table 7.3.1, Data Report):

- Administrative and Topographical Maps of the Province published by NAMRIA with scale of 1:150,000 and 1:50,000, respectively.
- Geological Map of the Philippines published by then BMGS with a scale of 1:1,000,000.
- Water Resource Investigation conducted by NWRB, 1986.
- Well Inventory Database prepared by NWRB, LWUA, DPWH.
- Well Inventory Database in the province.

##### **(2) Approach and Methodology**

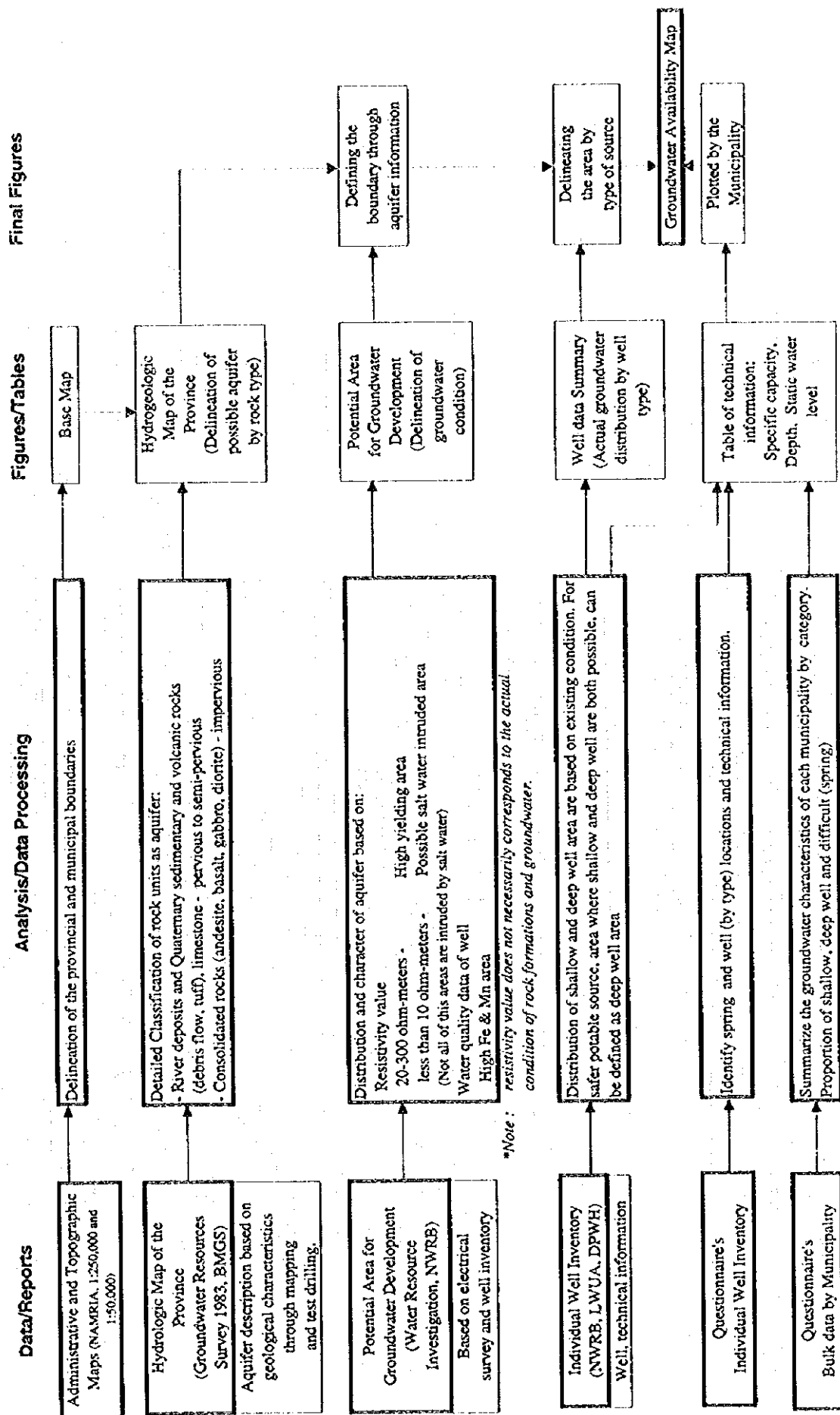
The procedure in preparing the Groundwater Availability Map is explained below with work flow depicted in Figure 7.3.1.

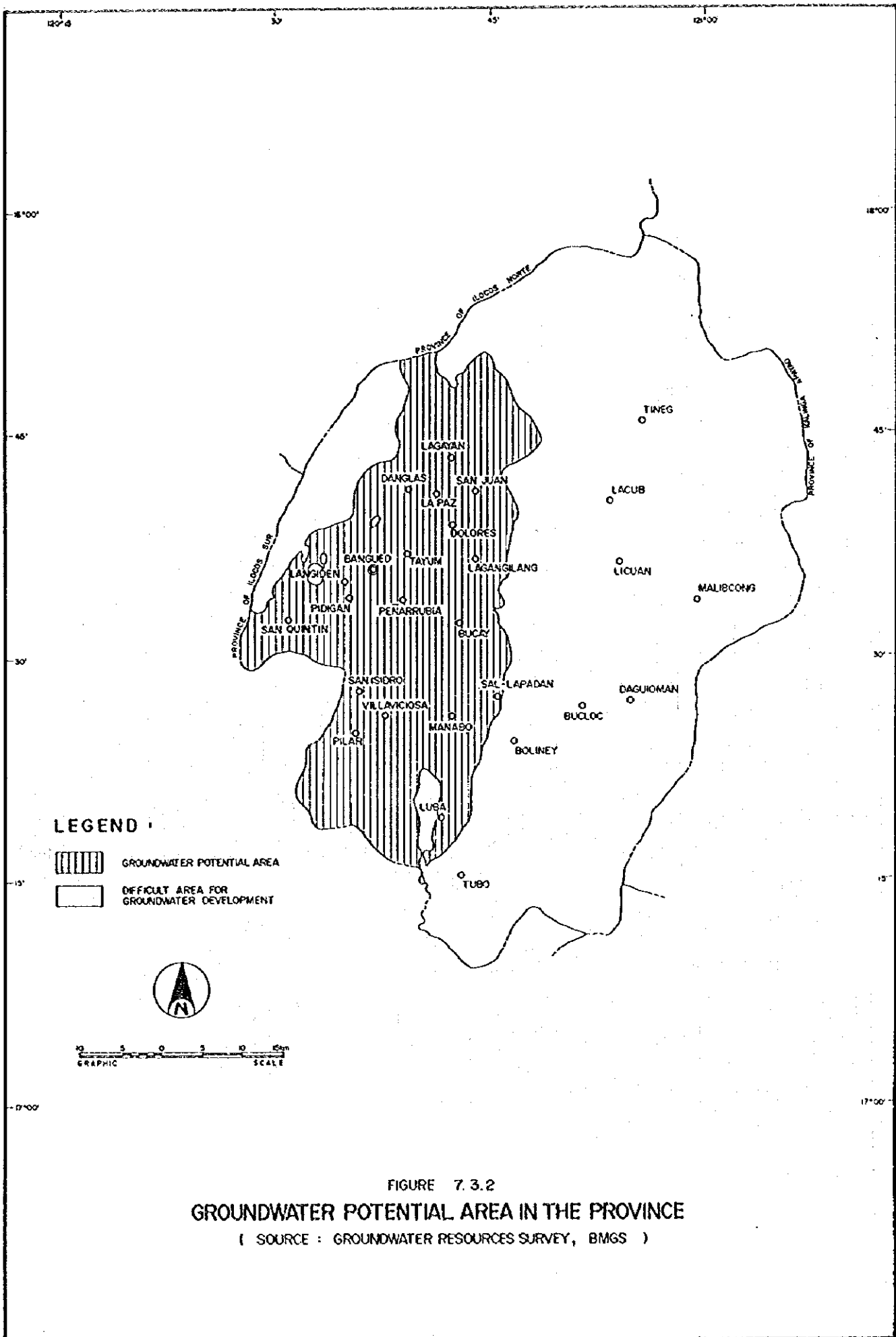
- 1) Prepare a base map with a scale of 1:400,000. The Administrative Map of NAMRIA (1:150,000) is used as reference map and details are verified from the Topographical Map (1:50,000). Basic information including rivers and provincial and municipal boundaries are indicated in the prepared base map.
- 2) The groundwater potential areas, based on the geology of the province, are delineated on the base map. The Recent alluvial and/or beach deposits, Pliocene-Pleistocene rocks (sandstone, conglomerate and volcanic pyroclastics) and Miocene sediments are regarded as possible aquifers considering their high porosity and permeability relative to older formations.

Aside from the defined boundaries of the areas underlain by pervious or groundwater bearing formations, difficult areas for the groundwater development are also delineated as presented in Figure 7.3.2.

- 3) Areas with potential high yielding aquifer and/or with saline water problem, as established in the Water Resources Investigation of NWRB, is reflected in the defined groundwater potential areas.

Figure 7.3.1 WORK FLOW OF GROUNDWATER AVAILABILITY MAP

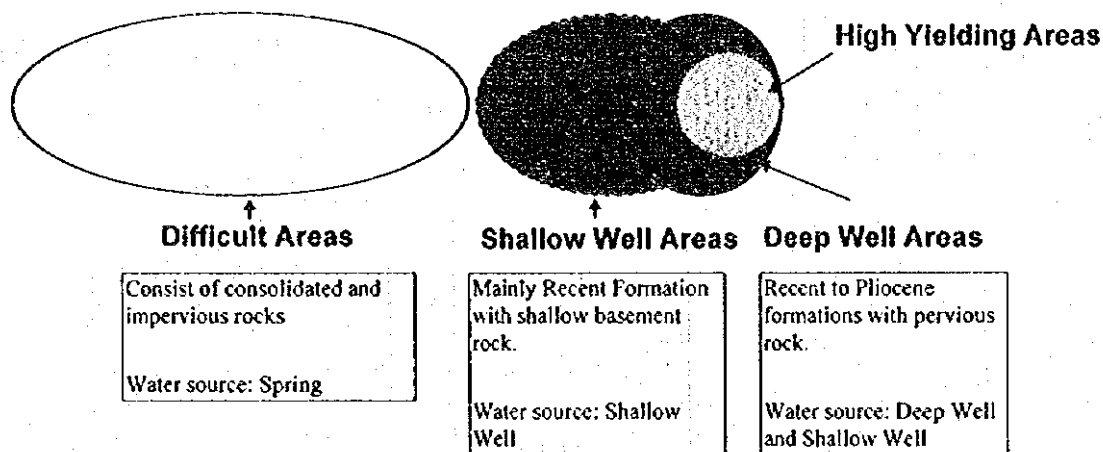




Based on the results of geo-electrical survey of the NWRB investigation, resistivity values of more than 12 ohm-meter indicate potential high yielding formation. Values less than 6 ohm-meters suggest clayey layer or saturated formation with high salinity. Figure 7.3.3 shows the boundaries of areas with high and low yielding aquifers, and high chloride concentration. In addition, considering the results of water quality examination of wells, areas with high iron and manganese contents are indicated on the map.

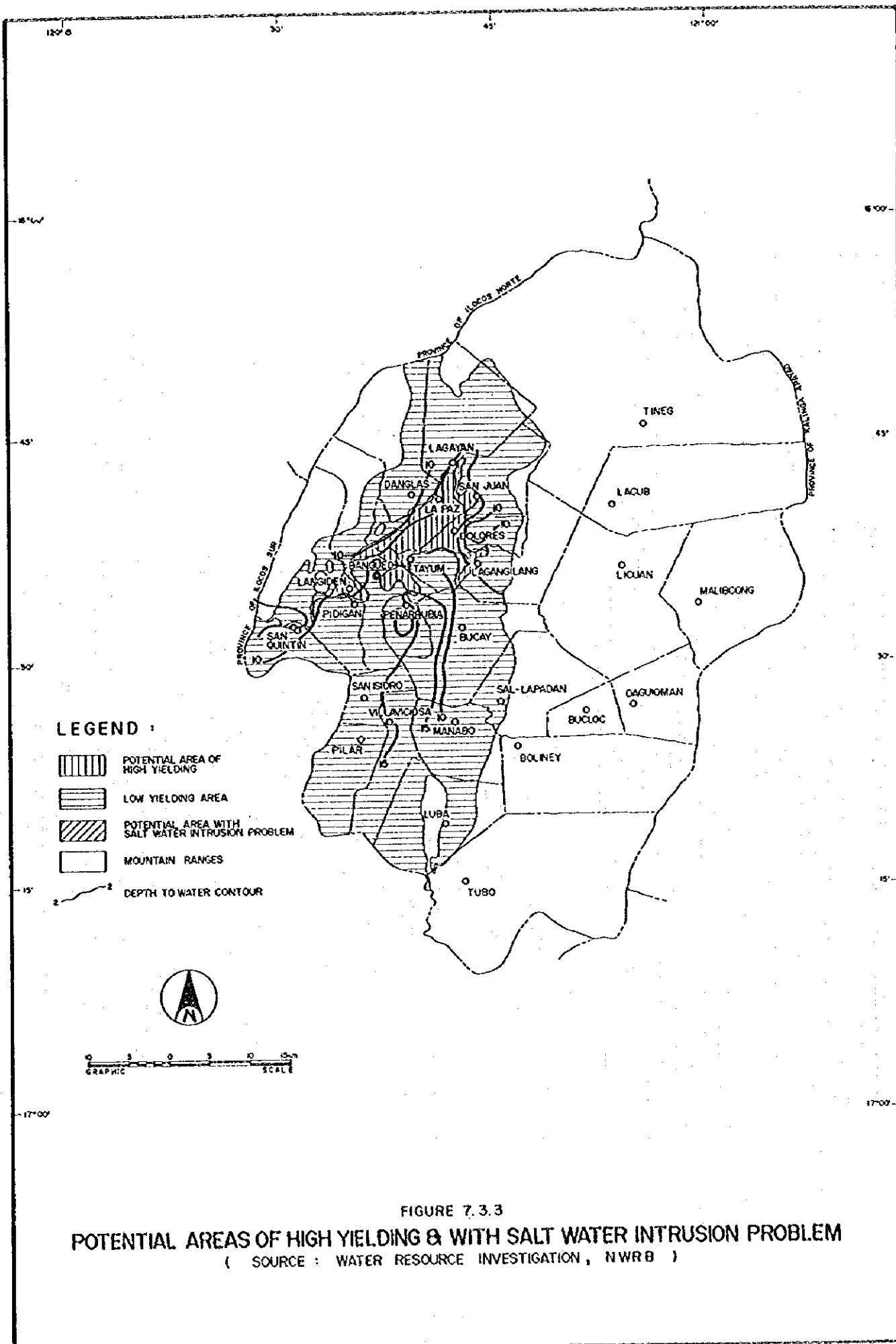
- 4) Delineate shallow and deep well areas based on the well inventory in each municipality (refer to Table 7.3.1, Data Report) and rock distribution. Figure 7.3.4 presents the categorization in terms of groundwater utilization.

**Figure 7.3.4 Area Category by Groundwater Utilization**



Shallow well areas are defined on the following basis:

- (a) Predominance of serviceable shallow wells and presence of deep wells with water quality problem and/or low yielding aquifers.
  - (b) Occurrence of impervious rocks beneath the Recent formation at shallow depth.
- 5) Based on the information provided by NWRBs well inventory and the data obtained through the questionnaires, well specifications for each municipality are established as shown in the map. These specifications are used as references in evaluating the groundwater availability in each locality. Individual well locations with technical information are presented in Figure 7.6.1, Data Report.



(3) Future updating and utilization of the map

For future updating of the map, the following procedure shall be employed:

- 1) Referring to the results of any supplementary water sources investigation by various agencies, redefine the potential area for groundwater development by applying the aforementioned procedures.
- 2) Update the provincial database using the questionnaires made for the study to make necessary revision of the delineated boundaries of groundwater categories.

## 7.4 Spring Sources

Table 7.4.1 Existing Spring Sources

Municipality	Developed Spring			Undeveloped Spring			Untapped Spring		
	Number	Discharge (l/sec)		Number	Discharge (l/sec)		Number	Discharge (l/sec)	
		Ave.	Range		Ave.	Range		Ave.	Range
Bangued	17								
Boliney	6								
Bucay	15								
Bucloc	4			3	1.73	1.30 - 2.20			
Daguioman	4								
Danglas	9								
Dolores	8								
Lacub	6								
Licuan	10			10	0.57	0.50 - 0.70			
Lagangilang	5			8	4.74	0.03 - 33.33			
Lagayan	2	1.25	1.00 - 1.50						
Langiden	3								
La Paz	0								
Luba	8								
Malibcong	15			5	0.09	0.06 - 0.13			
Manabo	10	1.72	0.20 - 3.00						
Penarrubia	5								
Pidigan	5								
Pilar	15	0.85	0.20 - 2.00	12	0.14	0.02 - 1.00			
Sallapadan	21								
San Isidro	1								
San Juan	1								
San Quintin	10								
Tayum	4								
Tineg	7			4	0.16	0.08 - 0.25			
Tubo	12			3	1.02	1.00 - 1.06	2	1.04	1.00 - 1.09
Villaviciosa	16			5	1.15	0.07 - 5.33			
<b>TOTAL</b>	<b>219</b>			<b>50</b>			<b>2</b>		

Source: PPDO/PSPT

## 7.5 Surface Water Sources

### (1) Study Rivers

Abra river is the principal stream draining the province. Among its tributaries, those that join its northernmost reaches are considered as separate basins in this study. These

tributaries are the Tineg, Sinalang, Soot and Malapao rivers. Abra and its tributary rivers can be categorized into two types based on drainage area and flow rate. The first type has narrow and relatively small drainage area (25-150km<sup>2</sup>) with lower flow rate (less than 10 cum./sec in average). The second type has an area of more than 500 km<sup>2</sup> with relatively higher flow rate (more than 10 cum./sec in average). This type of rivers is generally characterized by a long winding stream with numerous tributaries. Sinalang, Soot and Malapao rivers fall under the first type, while Abra and Tineg rivers represent the second type. Abra and Tineg rivers are can be considered potential sources of water supply since the most populated municipalities in Abra are located within their catchment areas. These rivers were selected for further study. Fig. 7.5.1 shows the river basins in the province and Table 7.5.1 presents basic information on the selected rivers.

**Table 7.5.1 River Information and Related Data**

River	Drainage Area (km <sup>2</sup> )	Flow Rate (cu. m/sec)			Relevant Information in the Basin	
		Minimum	Average	Maximum	Major Mun. & Population	Water District
Abra River	2,575	19.43	100.86	2,267.36	Bangued 28,666	Bangued WD
Tineg River	664	3.32	46.11	949.77	La Paz 9,265	None

1990 Population, NSO

## (2) Sampling Points and Examination Procedures

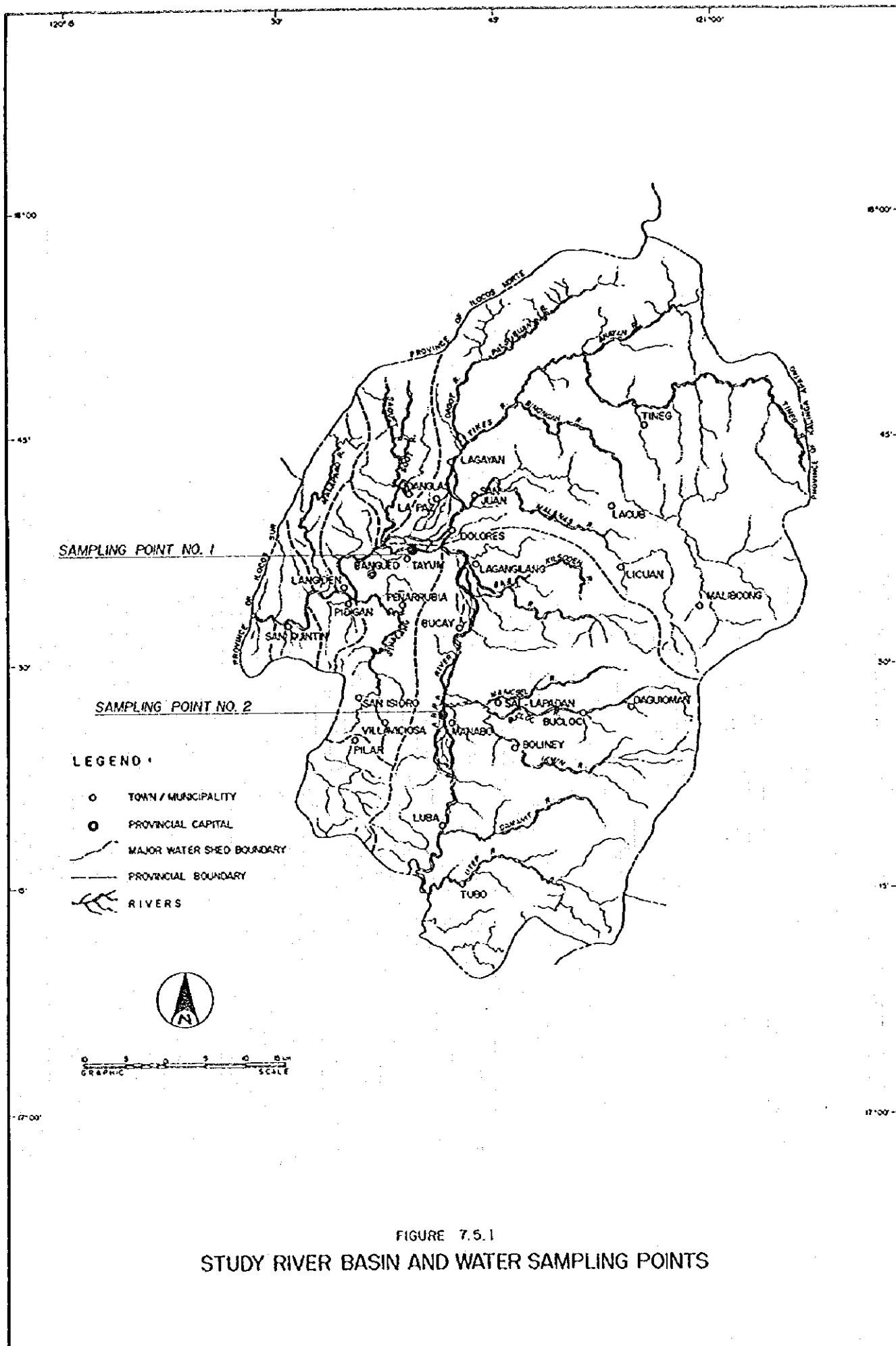
Water quality analysis of the Abra river was undertaken to determine the general characteristics of surface water in the province. The location of sampling points is shown in Figure 7.5.1.

Water sampling was conducted on June 29, 1995 at different points across the course of the river. The samples were sent to MWSS laboratory within 24 hours after they were taken. Flow rates were also measured at the sampling points. A composite sample for each river was prepared in proportion to their flow rates.

The water quality analysis was considered twelve (12) parameters and performed in accordance to the Philippine Standard Method for Analysis of Air and Water.

## (3) Results of Water Quality Analysis

Table 7.5.2 summarizes the results of analysis (refer to MWSS Central Laboratory Examination Results, 7.5 Data Report). Flow rates of upstream and downstream portions





of Abra river at the time of sampling were 7.48 and 10.34 m<sup>3</sup>/sec, respectively. The discharge of the river was close to its minimum recorded flow.

**Table 7.5.2 Water Quality Analysis Results**

Indices	Unit	Class "A" Water Quality Criteria for Fresh Surface Water	River		Remarks
			Abra Upstream	Abra Down Stream	
Color	units	50	40.00	35.00	within standard
Turbidity	units	-	37.00	51.00	
Conductivity	us/cm	-	270.00	240.00	
pH		6.5-8.5	7.90	8.00	within standard
Alkalinity	mg/L	-	96.00	78.00	
Total Hardness as CaCO <sub>3</sub>	mg/L	400	114.00	102.00	within standard
Sulfate (SO <sub>4</sub> )	mg/L	200	38.00	34.00	within standard
Chloride (Cl)	mg/L	200	13.10	10.00	within standard
Iron (Fe)	mg/L	1.0	3.60	3.30	excessive
Manganese (Mn)	mg/L	0.5	0.10	0.10	within standard
Ammonia-Nitrogen	mg/L	-	0.06	0.60	
BOD	mg/L	5	83.35	76.65	excessive

Generally, river water in the province contains high iron concentration. This is attributed to the iron-rich rocks which forms part of the drainage system, particularly the older formations. Likewise, the computed Biochemical Oxygen Demand (BOD: assumed conversion rate is BOD/COD = 1/2) of river exceeded the criteria for Class "A" fresh surface water. High BOD is assumed to be caused by presence of organic suspended solids, such as debris of plants, trees and eroded surface soil.

## 7.6 Future Development Potential of Water Sources

The questionnaires collected from each municipalities show that there are 1,377 wells existing in the province, while 179 wells are recorded in the inventory made by NWRB (See Tables 7.11 and 7.3.1, Data Report). Despite the smaller number of wells included in NWRB data, they were used in the analysis since technical information are provided. Of the total 179 wells, 168 have complete information; depth, static water level and specific capacity; and are summarized in Table 7.6.1.

Considering the well information, the most productive wells are those having depths ranging from 8 to 55 m. Wells drilled more than 55m in depth are notably having low specific capacities and most wells with more than 100m deep are abandoned. The good yielding wells have static water level ranging from 3 to 20 mbgl and specific capacity of 0.5 to 6.3 l/sec/m of drawdown.

Table 7.6.1 Well Sources Information\*

Municipality	Type	Number	Depth (m)		SWL (m)		Sp. Cap. (l/sec/m)	
			Ave.	Range	Ave.	Range	Ave.	Range
Bangued	SW	2	18.75	18.28 - 19.21	6.86	3.05 - 10.67	2.69	0.42 - 4.96
	DW	27	53.23	25.00 - 166.16	10.14	3.05 - 20.43	0.32	0.03 - 2.07
Boliney	SW	***						
	DW	***						
Bucay	SW	2	10.37	7.62 - 13.11	5.95	5.49 - 6.40	1.31	0.52 - 2.10
	DW	8	48.51	22.56 - 70.73	14.79	4.57 - 19.82	0.24	0.10 - 0.63
Bucloc	SW	***						
	DW	***						
Daguioan	SW	***						
	DW	***						
Danglas	SW	***						
	DW	6	46.19	21.03 - 71.64	8.89	7.62 - 13.72	0.83	0.16 - 2.07
Dolores	SW	2	16.08	12.34 - 19.82	6.56	5.49 - 7.62	0.20	0.18 - 0.21
	DW	12	46.34	27.44 - 76.22	9.83	2.44 - 18.29	0.72	0.05 - 4.87
Lacub	SW	***						
	DW	***						
Lagangilang	SW	***						
	DW	12	62.47	24.39 - 222.56	8.92	3.05 - 13.72	0.51	0.03 - 0.86
Lagayan	SW	***						
	DW	6	26.78	21.34 - 35.06	10.98	7.62 - 15.24	0.38	0.14 - 0.77
Langiden	SW	1	13.11	13.11 - 13.11	7.32	7.32 - 7.32	0.66	0.66 - 0.66
	DW	3	37.13	25.91 - 55.00	17.68	13.72 - 24.39	0.22	0.11 - 0.35
La Paz	SW	***						
	DW	16	38.79	21.34 - 76.22	9.20	0.00 - 20.73	0.25	0.03 - 0.93
Licuan	SW	***						
	DW							
Luba	SW	***						
	DW	***						
Malibcong	SW	***						
	DW	***						
Manabo	SW	***						
	DW	4	29.43	27.44 - 30.79	9.45	6.71 - 15.85	0.52	0.21 - 1.38
Peñarubia	SW	***						
	DW	4	60.14	25.61 - 73.17	14.48	6.10 - 22.87	0.33	0.07 - 0.83
Pidigan	SW	***						
	DW	11	43.42	22.56 - 79.27	0.00	0.00 - 0.00	0.14	0.02 - 0.52
Pilar	SW	1	19.82	19.82 - 19.82	9.15	9.15 - 9.15	0.29	0.29 - 0.29
	DW	10	35.28	27.44 - 60.10	12.44	2.44 - 19.82	0.18	0.07 - 0.33
Sal-lapadan	SW	1	9.15	9.15 - 9.15	2.44	2.44 - 2.44	1.03	1.03 - 1.03
	DW	***						
San Isidro	SW	***						
	DW	3	43.19	32.01 - 50.30	13.21	10.67 - 16.77	0.23	0.07 - 0.52
San Juan	SW	***						
	DW	3	45.32	23.17 - 80.79	9.35	3.05 - 15.85	0.19	0.14 - 0.21
San Quintin	SW	***						
	DW	9	36.28	22.87 - 54.88	13.86	8.23 - 20.73	0.32	0.02 - 1.04
Tayum	SW	***						
	DW	13	40.05	24.90 - 79.60	9.60	2.13 - 22.87	0.66	0.02 - 6.30
Tineg	SW	***						
	DW	***						
Tubo	SW	***						
	DW	***						
Villaviciosa	SW	***						
	DW	6	44.92	32.01 - 64.02	12.19	7.62 - 15.24	0.16	0.05 - 0.21
Provincial Total	SW	9	14.72	7.62 - 19.82	6.40	2.44 - 10.67	1.15	0.18 - 4.96
	DW	159	44.23	21.03 - 222.56	10.14	2.13 - 24.39	0.38	0.02 - 6.30

Source: NWRB Well Inventory Database.

Notes:

\*Based on the data from Feasibility Study of WDs, LWUA and DPWH (Questionable data were disregarded).

\*\*Estimated figures from the hydrogeological continuity of the aquifer.

\*\*\*No related technical information available.

Legend:

SW=Shallow Well

Sp. Cap.=Specific Capacity  
DW=Deep Well

Ave.=Average

Based on the hydraulic characteristics and distribution of wells in Abra, good aquifers occur in the Recent deposits that are widespread in the broad valley flat of Abra river and its tributaries. The aquifers in the Plio-Pleistocene rocks in Danglas and La Paz, which are also tapped by some of the wells, are expected to have good to moderate yields. Moderate yielding aquifers are anticipated in the Miocene limestone and the upper fractured portions of the older formations.

As indicated in Groundwater Investigation of NWRB, high calcium concentration is reported in Dolores. This is attributed to the dissolution of the limestone in the area. Similar water is expected in Lagayan, San Juan, Dolores, Langangilang, Bucay, Villaviciosa and Peñarrubia, where limestone also occur. In addition, odorous water in some wells of Poblacion, La Paz and Siblong, Bucay is also accounted. This is probably caused by hydrogen sulfide gas derived from decomposition organic matters buried in the Recent alluvium.

As an alternative to wells, the untapped springs identified can be developed. These are also the most practical sources of water supply in the area considered as difficult for well development, particularly in the municipalities of Tineg, Lacub, Licuan, Malibcong, Daguioman, Luba, Tubo, Boliney and Bucloc. The major faults dissecting the province provide interconnected fractures in the various rock units which are favorable for spring occurrences.

The detailed hydrogeological characteristics of each municipality are summarized in Table 7.6.2, while individual well locations with technical information are shown in Figure 7.6.1, Data Report. For water supply planning purposes, standard well specifications for each municipality are presented in Table 7.6.3. The specifications made in this study are intended for planning purposes. The design of wells for implementation will be based on the results of detailed investigations that must be made prior to construction.

The depth, static water level and specific capacity specified in Table 7.6.3 are established using the well information from NWRB, pertinent studies from other agencies and the hydrogeological assessment presented in Table 7.6.2. The depth of wells in each municipality is estimated based on the inferred depth of potential aquifers approximated from the available data on existing wells. The static water level and specific capacity are the averages of existing wells employed in the analysis. For municipalities without any well data, the well parameters are made similar to adjoining towns, provided they have similar hydrogeologic features. It should be noted that for municipalities categorized as deep well areas, specifications for shallow wells are indicated since such type of well is still possible for the locality.

Table 7.6.2 Hydrogeological Description by Municipality

MUNICIPALITY	EXISTING CONDITION										DATA INTERPRETATION												
	TOPOGRAPHY	LITHOLOGIC UNITS (%)					WELL INFORMATION					SPRING					GROUNDWATER AVAILABILITY			AQUIFER FORMATION	ESTIMATED AQUIFER DEPTH RANGE (m)	OTHERS	
		R N3 N2 N1 O					DEPTH (m)	AVE		MAX/AVE SWL (m bgl)	SP. CAP. (l/s/m)	TAPPED		UNTAPPED		SW	DW	DY					
		R	N3	N2	N1	O		NO.	AVE. Q (l/s)			NO.	AVE. Q (l/s)										
Bangued	flat	20	0	30	20	30	19	25-166	7	10	0.42-4.96	0.03-2.07	18	-	-	-	0	70	30	Alluvium / Plio-Pleistocene rocks	21-60	Potential good aquifers occur in the broad flood plain along Abra and Ting rivers with estimated Sp. Cap of 1.0 to 2.5 l/s/m. Springs are numerous in the south with maximum yield of 208 l/s.	
Boliney	mountainous	0	0	0	60	40	-	-	-	-	-	-	-	-	-	-	0	0	100			No well record. Mainly spring area.	
Bucay	flat to mountainous	20	0	0	60	20	7-13	23-71	6	15	0.52-2.10	0.10-0.63	17	2.5	-	-	0	80	20	Alluvium / Miocene rocks	21-60	Potential good aquifers occur in the broad flood plain along Abra river with Sp. Cap of 1.0 to 2.5 l/s/m. Springs are numerous on valley sides.	
Bucloc	mountainous	0	0	0	100	0	-	-	-	-	-	-	-	3	5	3	-	0	0	100			No well record. Mainly spring area.
Dagupan	mountainous	0	0	0	50	50	-	-	-	-	-	-	-	4	0.2	-	-	0	0	100			No well record. Mainly spring area.
Dangas	hilly to mountainous	10	10	25	15	50	-	21-72	9	-	0.16-2.07	-	3	10.5	-	-	0	50	50	Alluvium / Plio-Pleistocene rocks	21-60	Potential good aquifers are exposed in the southeastern section but are limited in the narrow valley flat with Sp. Cap of 1.0-2.5 l/s/m. Mainly spring area.	
Dolores	flat to mountainous	30	0	30	30	10	12-20	27-70	7	10	0.18-0.21	0.05-4.87	7	1.5	-	-	0	90	10	Alluvium / Miocene rocks	21-60	Good aquifers occur in the flood plain of Ting river with Sp. Cap. of 1.0-2.5 l/s/m. Eastern hilly portion is mainly spring area. High calcium and hard water in the area is attributed to limestone.	
Laab	mountainous	0	0	0	50	50	-	-	-	-	-	-	-	6	1	-	-	0	0	100			No well record. Mainly spring area.
Lican	mountainous	0	0	0	40	60	-	-	-	-	-	-	-	-	-	10	1.4	0	0	100			No well record. Mainly spring area.
Luzanglag	hilly to mountainous	15	0	15	5	65	-	21-35	-	11	-	0.14-0.77	-	-	-	8	4.73	0	30	70	Alluvium / Miocene rocks	21-60	Good aquifers occur in the flood plain of Abra river with Sp. Cap of 1.0-2.5 l/s/m. Northeastern portion is mainly spring area.
Lugayan	hilly to mountainous	20	5	0	75	0	-	21-35	-	11	-	0.14-0.77	-	-	-	-	-	0	90	10	Alluvium / Miocene rocks	21-60	Good aquifer is limited the flood plain of Abra river in the southeastern section with Sp. Cap of 1.0-2.5 l/s/m. Northern portion is mainly spring area.

Table 7.6.2 Hydrogeological Description by Municipality

MUNICIPALITY		EXISTING CONDITION										DATA INTERPRETATION									
		TOPOGRAPHY	LITHOLOGIC UNITS					WELL INFORMATION					SPRING			GROUNDWATER AVAILABILITY			AQUIFER FORMATION	ESTIMATED AQUIFER DEPTH RANGE (m)	OTHERS
			%					DEPTH (m)	AVE.		MAX. AVE. SP. CAP. (l/s/m)	TAPPED	NO.		SW	DW	%				
			R	N3	N2	N1	O		SW	DW			SW	DW				NO.			
Lengiden	hilly to mountainous	25	5	0	20	50	13	26-55	7	18	0.66	0.11-0.35	3	1	-	0	50	50	Alluvium / Plio-Pleistocene rocks	21-60	Good aquifer is limited in the valley flat in the southern portion with Sp. Cap. of 1.0-2.5 l/s/m. Mainly spring area.
La Paz	flat	90	0	10	0	0	-	21-76	-	9	-	0.03-0.93	-	-	-	0	100	0	Alluvium / Plio-Pleistocene rocks	21-60	Potential occurs in the alluvial plain of Tingue river with Sp. Cap. of 1.0-2.5 l/s/m. Springs are numerous in the western portion.
Luba	flat mountainous	10	0	0	90	0	-	-	-	-	-	-	-	-	-	0	60	40	Alluvium / Miocene rocks	21-40	No well record. Potential aquifers are expected to have Sp. Cap. of 1.0 l/s/m. Mostly spring area.
Malibcong	mountainous	0	0	0	40	60	-	-	-	-	-	-	15	-	5	0	0	100	-	-	No well record. Mostly spring area.
Manabo	hilly to mountainous	20	0	0	60	20	-	27-31	-	9	-	0.21-1.38	10	-	-	0	80	20	Alluvium / Miocene rocks	21-40	Potential aquifers occurs in the river terrace and fan deposits with expected Sp. Cap. of 1.0-2.5 l/s/m. Springs are numerous in the western portion.
Penamutia	hilly	0	0	50	50	0	-	26-75	-	15	-	0.07-0.83	-	-	-	0	100	0	Alluvium / Miocene rocks	21-60	Possible aquifers are expected to have Sp. Cap. of 1.0-2.5 l/s/m. Spring are common source of water supply.
Pidigen	flat to mountainous	10	0	0	90	0	-	23-79	-	-	-	0.02-0.52	2	25.46	-	0	100	0	Alluvium / Miocene rocks	21-60	Potential aquifer occurs in the alluvial plain of Abra river with Sp. Cap. of 1.0-2.5 l/s/m. Springs are numerous in the southern portion.
Pilar	hilly	0	0	0	100	0	20	27-60	9	12	0.29	0.07-0.33	12	-	12	0	100	0	Alluvium / Miocene rocks	21-40	Potential aquifers are expected to have Sp. Cap. of 1.0-2.5 l/s/m. Springs are common.
Sal-lapedan	mountainous	0	0	0	60	40	9	-	2	-	1.03	-	21	7	-	0	25	75	Alluvium / Miocene rocks	21-40	Potential aquifer is limited in the valley flat of Ilkmin river with expected Sp. Cap. of 0.5-1.0 l/s/m. Mainly spring area.
San Isidro	hilly	0	0	30	70	0	-	32-50	-	13	-	0.07-0.52	1	7	-	0	100	0	Alluvium / Miocene rocks	21-40	Possible aquifers are expected to have Sp. Cap. of 0.5-1.0 l/s/m.
San Juan	flat to mountainous	20	0	30	30	20	-	23-81	-	9	-	0.14-0.21	4	-	-	0	80	20	Alluvium / Miocene rocks	21-60	Potential aquifers are expected to have Sp. Cap. of 0.5-1.5 l/s/m.

Table 7.6.2 Hydrogeological Description by Municipality

MUNICIPALITY		EXISTING CONDITION														DATA INTERPRETATION						OTHERS
		TOPOGRAPHY	LITHOLOGIC UNITS (%)					WELL INFORMATION					SPRING			GROUNDWATER AVAILABILITY (%)	AQUIFER FORMATION	ESTIMATED AQUIFER DEPTH RANGE (m)				
			R	N3	N2	N1	O	DEPTH (m)		AVE SWL (m/bgl)	MAX./AVE. SP. CAP. (l/4/m)		TAPPED NO.	AVE. Q (l/s)	UNTAPPED NO.				AVE. Q (l/s)			
								SW	DW		SW	DW								SW	DW	
San Quintin	hilly to mountainous	0	0	0	100	0	-	23-55	-	14	-	0.02-1.04	8	0.43	-	0	100	0	Alluvium / Miocene rocks	21-60	Potential aquifers are expected to have Sp. Cap. of 1.0-2.5 l/s/m. Springs are common.	
Tayum	flat to hilly	20	0	40	40	0	-	25-80	-	10	-	0.02-6.30	5	20	-	0	100	0	Alluvium / Miocene sediments	21-60	Potential aquifer occurs in the alluvial plain of Abra river with Sp. Cap. of 1.0-2.5 l/s/m. Springs are common.	
Tineg	mountainous	0	0	0	30	70	-	-	-	-	-	-	7	0.25	4	0.1	0	0	100	-	No well record. Potential aquifers are expected to have Sp. Cap. of 0.5 l/s/m. Basically spring area.	
Tubo	mountainous	0	0	0	50	50	-	-	-	-	-	-	13	-	5	1.03	0	0	100	-	No well record. Essentially spring area	
Villavieja	mountainous	0	0	0	100	0	-	32-64	-	12	-	0.05-0.21	7	0.83	5	0.1	0	100	0	Alluvium / Miocene sediments	21-40	Potential aquifers are expected to have Sp. Cap. of 0.5-1.0 l/s/m.

Note:

R = Recent Deposits

N<sub>3</sub> = Late Miocene Rocks

N<sub>2</sub> = Early Miocene Rocks

N<sub>1</sub> = Plio-Pleistocene Rocks

O = Rocks Older than Miocene

SW = Shallow Well Area

DW = Deep Well

DF = Difficult Area

Q = Discharge/Flow Rate

mbgl = meter below ground level

SWL = Static Water Level

1/s/m = liter/second/meter (draw-down)

SP, CAP = Specific Capacity

Table 7.6.3 Standard Specification of Wells by Municipality\*

Municipality	Type	Type	Proportion** (%)	Standard Specification			Remarks
				Depth Range (m)	SWL (m)	Specific Capacity (l/sec/m)	
Bangued	Rural	SW	0	10 < D < 20	5	1.0	
		DW	100	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Golincy	Rural	SW	0	-	-	-	
		DW	0	-	-	-	
	Urban	SW	0	-	-	-	
		DW	0	-	-	-	
Bucay	Rural	SW	0	10 < D < 20	5	1.0	
		DW	70	20 < D < 60	15	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	15	2.5	
Buctoc	Rural	SW	0	-	-	-	2 untapped springs with 1.0 l/sec potential discharge
		DW	0	-	-	-	
	Urban	SW	-	-	-	-	
		DW	-	-	-	-	
Daguioman	Rural	SW	0	-	-	-	
		DW	0	-	-	-	
	Urban	SW	-	-	-	-	
		DW	-	-	-	-	
Danglas	Rural	SW	0	10 < D < 20	5	1.0	
		DW	40	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Dolores	Rural	SW	0	10 < D < 20	5	1.5	
		DW	70	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Lacub	Rural	SW	0	-	-	-	
		DW	0	-	-	-	
	Urban	SW	0	-	-	-	
		DW	0	-	-	-	
Lagangilang	Rural	SW	0	10 < D < 20	5	1.0	
		DW	20	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	90	20 < D < 60	10	2.5	
Lagayan	Rural	SW	0	10 < D < 20	5	1.0	
		DW	80	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Langiden	Rural	SW	0	10 < D < 20	5	1.0	
		DW	40	20 < D < 60	15	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	25	2.5	
La Paz	Rural	SW	0	10 < D < 20	5	1.0	
		DW	100	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Licuan	Rural	SW	0	-	-	-	
		DW	0	-	-	-	
	Urban	SW	0	-	-	-	
		DW	0	-	-	-	
Luba	Rural	SW	0	10 < D < 20	5	1.0	
		DW	60	20 < D < 40	15	1.0	
	Urban	SW	0	10 < D < 20	5	1.0	
		DW	60	20 < D < 40	15	1.0	

Table 7.6.3 Standard Specification of Wells by Municipality\*

Municipality		Type	Proportion** (%)	Standard Specification			Remarks
				Depth Range (m)	SWL (m)	Specific Capacity (l/sec/m)	
Molihong	Rural	SW	0	-	-	-	
		DW	0	-	-	-	
	Urban	SW	-	-	-	-	
		DW	-	-	-	-	
Manabo	Rural	SW	0	10 < D < 20	5	1.0	
		DW	70	20 < D < 40	15	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 40	15	2.5	
Penarrubia	Rural	SW	0	10 < D < 20	5	1.0	
		DW	100	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	20	2.5	
Pidigan	Rural	SW	0	10 < D < 20	5	1.0	
		DW	100	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Pilar	Rural	SW	0	10 < D < 20	10	0.5	
		DW	100	20 < D < 40	10	0.5	
	Urban	SW	0	10 < D < 20	10	1.0	
		DW	100	20 < D < 40	10	1.0	
Sallapadan	Rural	SW	0	10 < D < 20	5	0.5	
		DW	20	20 < D < 40	10	0.5	
	Urban	SW	0	10 < D < 20	2	1.0	
		DW	50	20 < D < 40	10	1.0	
San Isidro	Rural	SW	0	10 < D < 20	10	0.5	
		DW	100	20 < D < 40	15	0.5	
	Urban	SW	0	10 < D < 20	10	1.0	
		DW	100	20 < D < 40	10	1.0	
San Juan	Rural	SW	0	10 < D < 20	5	1.0	
		DW	80	20 < D < 60	15	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
San Quintin	Rural	SW	0	10 < D < 20	5	1.0	
		DW	100	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	20	2.5	
Tayum	Rural	SW	0	10 < D < 20	5	1.0	
		DW	100	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Tineg	Rural	SW	0	10 < D < 20	5	0.5	
		DW	2	20 < D < 40	10	0.5	
	Urban	SW	-	-	-	-	
		DW	-	-	-	-	
Tubo	Rural	SW	0	-	-	-	
		DW	0	-	-	-	
	Urban	SW	-	-	-	-	
		DW	-	-	-	-	
Villavieja	Rural	SW	0	10 < D < 20	10	0.5	
		DW	100	20 < D < 40	10	0.5	
	Urban	SW	0	10 < D < 20	10	1.0	
		DW	100	20 < D < 40	15	1.0	



**B. FUTURE REQUIREMENTS AND  
DEVELOPMENT PLAN**

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## 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

Municipalities	Type	Population (1995)	Population Served by 1995 Facilities				Pop. Served by Planned/Ongoing Projects				Pop. Served in the Base Year (1995)				
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	% Coverage
Bangued (Capital)	Urban	14,904	10,309	0	4,115	14,424	0	0	0	0	10,309	0	4,115	14,424	97
	Rural	22,455	4,309	2,544	13,762	20,615	0	0	0	0	4,309	2,544	13,762	20,615	92
	Total	37,359	14,618	2,544	17,877	35,039	0	0	0	0	14,618	2,544	17,877	35,039	94
Boliney	Urban	770	675	35	0	710	0	0	0	0	675	35	0	710	92
	Rural	3,424	2,265	340	0	2,605	0	0	0	0	2,265	340	0	2,605	76
	Total	4,194	2,940	375	0	3,315	0	0	0	0	2,940	375	0	3,315	79
Bucay	Urban	2,753	0	1,080	1,467	2,547	0	0	0	0	0	1,080	1,467	2,547	95
	Rural	11,107	290	4,357	4,877	9,524	0	0	0	0	290	4,357	4,877	9,524	86
	Total	13,860	290	5,437	6,344	12,071	0	0	0	0	290	5,437	6,344	12,071	87
Bucloc	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	2,120	0	1,008	0	1,008	0	0	0	0	0	1,008	0	1,008	48
	Total	2,120	0	1,008	0	1,008	0	0	0	0	0	1,008	0	1,008	48
Dagupan	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	1,500	0	610	0	610	0	0	0	0	0	610	0	610	41
	Total	1,500	0	610	0	610	0	0	0	0	0	610	0	610	41
Danglas	Urban	1,555	0	364	1,157	1,521	0	0	0	0	0	364	1,157	1,521	98
	Rural	1,701	215	587	641	1,443	0	125	0	125	215	712	641	1,568	92
	Total	3,256	215	951	1,798	2,964	0	125	0	125	215	1,076	1,798	3,089	95
Dolores	Urban	1,867	1,250	0	595	1,845	0	0	0	0	1,250	0	595	1,845	99
	Rural	7,395	125	579	6,466	7,170	0	0	0	0	125	579	6,466	7,170	97
	Total	9,262	1,375	579	7,061	9,015	0	0	0	0	1,375	579	7,061	9,015	97
Lacub	Urban	671	0	324	0	324	0	0	0	0	0	324	0	324	48
	Rural	1,815	0	476	382	858	0	0	0	0	0	476	382	858	47
	Total	2,486	0	800	382	1,182	0	0	0	0	0	800	382	1,182	48
Lagangilang	Urban	2,490	1,025	0	1,206	2,231	0	0	0	0	1,025	0	1,206	2,231	90
	Rural	9,772	435	0	6,531	6,966	0	0	0	0	435	0	6,531	6,966	71
	Total	12,262	1,460	0	7,737	9,197	0	0	0	0	1,460	0	7,737	9,197	75
Lagayan	Urban	854	0	0	594	594	0	0	0	0	0	0	594	594	70
	Rural	2,580	0	531	318	849	0	0	0	0	0	531	318	849	33
	Total	3,434	0	531	912	1,443	0	0	0	0	0	531	912	1,443	42
Langiden	Urban	350	0	120	220	340	0	0	0	0	0	120	220	340	97
	Rural	2,206	0	221	1,894	2,115	0	0	0	0	0	221	1,894	2,115	96
	Total	2,556	0	341	2,114	2,455	0	0	0	0	0	341	2,114	2,455	96
La Paz	Urban	3,362	0	0	3,089	3,089	0	0	0	0	0	0	3,089	3,089	92
	Rural	9,058	0	0	6,835	6,835	0	0	0	0	0	0	6,835	6,835	75
	Total	12,420	0	0	9,924	9,924	0	0	0	0	0	0	9,924	9,924	80
Licuan	Urban	654	395	190	0	585	0	0	0	0	395	190	0	585	89
	Rural	3,391	965	1,198	0	2,163	0	0	0	0	965	1,198	0	2,163	64
	Total	4,045	1,360	1,388	0	2,748	0	0	0	0	1,360	1,388	0	2,748	68
Luba	Urban	1,167	815	116	0	931	0	0	0	0	815	116	0	931	80
	Rural	4,765	605	1,139	0	1,744	0	0	0	0	605	1,139	0	1,744	37
	Total	5,932	1,420	1,255	0	2,675	0	0	0	0	1,420	1,255	0	2,675	45

Table 8.2.1 Estimation of Base Year Service Coverage of Water Supply (Cont'd.)

Municipalities	Type	Population (1995)	Population Served by 1995 Facilities				Pop. Served by Planned/On-going Projects				Pop. Served in the Base Year (1995)				
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	% Coverage
Mahabang	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	3,705	0	2,845	0	2,845	0	0	0	0	0	2,845	0	2,845	77
	Total	3,705	0	2,845	0	2,845	0	0	0	0	0	2,845	0	2,845	77
Manabo	Urban	3,968	0	1,196	2,511	3,707	0	0	0	0	0	1,196	2,511	3,707	93
	Rural	4,515	0	2,219	1,934	4,153	0	0	0	0	0	2,219	1,934	4,153	92
	Total	8,483	0	3,415	4,445	7,860	0	0	0	0	0	3,415	4,445	7,860	93
Penarrubia	Urban	1,049	829	220	0	1,049	0	0	0	0	829	220	0	1,049	100
	Rural	4,299	1,596	784	1,525	3,905	0	0	0	0	1,596	784	1,525	3,905	91
	Total	5,348	2,425	1,004	1,525	4,954	0	0	0	0	2,425	1,004	1,525	4,954	93
Pidigan	Urban	2,655	0	980	1,638	2,618	0	0	0	0	0	980	1,638	2,618	99
	Rural	7,113	0	732	5,671	6,403	0	0	0	0	0	732	5,671	6,403	90
	Total	9,768	0	1,712	7,309	9,021	0	0	0	0	0	1,712	7,309	9,021	92
Pilar	Urban	1,303	1,000	178	0	1,178	0	0	0	0	1,000	178	0	1,178	90
	Rural	7,660	965	1,156	3,587	5,708	0	0	0	0	965	1,156	3,587	5,708	75
	Total	8,963	1,965	1,334	3,587	6,886	0	0	0	0	1,965	1,334	3,587	6,886	77
Sal Lapadan	Urban	1,424	0	660	0	660	0	0	0	0	0	660	0	660	46
	Rural	3,892	0	2,614	0	2,614	0	0	0	0	0	2,614	0	2,614	67
	Total	5,316	0	3,274	0	3,274	0	0	0	0	0	3,274	0	3,274	62
San Isidro	Urban	552	0	240	285	525	0	0	0	0	0	240	285	525	95
	Rural	3,572	0	330	2,753	3,083	0	0	0	0	0	330	2,753	3,083	86
	Total	4,124	0	570	3,038	3,608	0	0	0	0	0	570	3,038	3,608	87
San Juan	Urban	1,329	0	216	877	1,093	0	0	0	0	0	216	877	1,093	82
	Rural	7,797	0	0	5,601	5,601	0	0	0	0	0	0	5,601	5,601	72
	Total	9,126	0	216	6,478	6,694	0	0	0	0	0	216	6,478	6,694	73
San Quintin	Urban	738	0	260	0	260	0	0	0	0	0	260	0	260	35
	Rural	3,968	0	1,665	889	2,554	0	0	0	0	0	1,665	889	2,554	64
	Total	4,706	0	1,925	889	2,814	0	0	0	0	0	1,925	889	2,814	60
Tayum	Urban	2,268	1,500	50	621	2,171	0	0	0	0	1,500	50	621	2,171	96
	Rural	9,569	520	2,227	5,332	8,079	0	0	0	0	520	2,227	5,332	8,079	84
	Total	11,837	2,020	2,277	5,953	10,250	0	0	0	0	2,020	2,277	5,953	10,250	87
Tineg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	3,109	0	1,215	0	1,215	0	0	0	0	0	1,215	0	1,215	39
	Total	3,109	0	1,215	0	1,215	0	0	0	0	0	1,215	0	1,215	39
Tubo	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	5,111	1,215	1,814	0	3,029	0	0	0	0	1,215	1,814	0	3,029	59
	Total	5,111	1,215	1,814	0	3,029	0	0	0	0	1,215	1,814	0	3,029	59
Villavieja	Urban	788	0	520	236	756	0	0	0	0	0	520	236	756	96
	Rural	4,209	0	2,582	1,152	3,734	0	0	0	0	0	2,582	1,152	3,734	89
	Total	4,997	0	3,102	1,388	4,490	0	0	0	0	0	3,102	1,388	4,490	90
Provincial Total	Urban	47,471	17,798	6,749	18,611	43,158	0	0	0	0	17,798	6,749	18,611	43,158	91
	Rural	151,808	13,505	33,773	70,150	117,428	0	125	0	125	13,505	33,898	70,150	117,553	77
	Total	199,279	31,303	40,522	88,761	160,586	0	125	0	125	31,303	40,647	88,761	160,711	81

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

Municipalities	Type	Population Served by Existing Facilities				1995		2000	
		Level III	Level II	Level I	Total	Total Population	% Coverage	Total Population	% Coverage
Bangueo (Capital)	Urban	10,309	0	4,115	14,424	14,904	97	15,765	91
	Rural	4,309	2,544	13,762	20,615	22,455	92	23,753	87
	Total	14,618	2,544	17,877	35,039	37,359	94	39,518	89
Boliney	Urban	675	35	0	710	770	92	814	87
	Rural	2,265	340	0	2,605	3,424	76	3,622	72
	Total	2,940	375	0	3,315	4,194	79	4,436	75
Bucay	Urban	0	1,080	1,467	2,547	2,753	93	2,912	87
	Rural	290	4,357	4,877	9,524	11,107	86	11,749	81
	Total	290	5,437	6,344	12,071	13,860	87	14,661	82
Bucloc	Urban	0	0	0	0	0	0	0	0
	Rural	0	1,008	0	1,008	2,120	48	2,243	45
	Total	0	1,008	0	1,008	2,120	48	2,243	45
Daguioman	Urban	0	0	0	0	0	0	0	0
	Rural	0	610	0	610	1,500	41	1,587	38
	Total	0	610	0	610	1,500	41	1,587	38
Danglas	Urban	0	364	1,157	1,521	1,555	98	1,645	92
	Rural	215	712	641	1,568	1,701	92	1,799	87
	Total	215	1,076	1,798	3,089	3,256	95	3,444	90
Dolores	Urban	1,250	0	595	1,845	1,867	99	1,975	93
	Rural	125	579	6,466	7,170	7,395	97	7,822	92
	Total	1,375	579	7,061	9,015	9,262	97	9,797	92
Lacub	Urban	0	324	0	324	671	48	710	46
	Rural	0	476	382	858	1,815	47	1,920	45
	Total	0	800	382	1,182	2,486	48	2,630	45
Lagangilang	Urban	1,025	0	1,206	2,231	2,490	90	2,634	85
	Rural	435	0	6,531	6,966	9,772	71	10,337	67
	Total	1,460	0	7,737	9,197	12,262	75	12,971	71
Lagayan	Urban	0	0	594	594	854	70	903	66
	Rural	0	531	318	849	2,580	33	2,729	31
	Total	0	531	912	1,443	3,434	42	3,632	40
Langiden	Urban	0	120	220	340	350	97	370	92
	Rural	0	221	1,894	2,115	2,206	96	2,334	91
	Total	0	341	2,114	2,455	2,556	96	2,704	91
La Paz	Urban	0	0	3,089	3,089	3,362	92	3,556	87
	Rural	0	0	6,835	6,835	9,058	75	9,582	71
	Total	0	0	9,924	9,924	12,420	80	13,138	76
Licuan	Urban	395	190	0	585	654	89	692	85
	Rural	965	1,198	0	2,163	3,391	64	3,587	60
	Total	1,360	1,388	0	2,748	4,045	68	4,279	64
Luba	Urban	815	116	0	931	1,167	80	1,233	75
	Rural	605	1,139	0	1,744	4,765	37	5,011	35
	Total	1,420	1,255	0	2,675	5,932	45	6,275	43

**Table 8.2.2 Population Coverage in Phase I Provided by Served Population in the Base Year  
(Water Supply) (Cont'd.)**

Municipalities	Type	Population Served by Existing Facilities				1995		2000	
		Level III	Level II	Level I	Total	Total Population	% Coverage	Total Population	% Coverage
Malabong	Urban	0	0	0	0	0	0	0	0
	Rural	0	2,845	0	2,845	3,705	77	3,919	73
	Total	0	2,845	0	2,845	3,705	77	3,919	73
Manabo	Urban	0	1,196	2,511	3,707	3,968	93	4,197	88
	Rural	0	2,219	1,934	4,153	4,515	92	4,776	87
	Total	0	3,415	4,445	7,860	8,483	93	8,973	88
Penarubia	Urban	829	220	0	1,049	1,049	100	1,110	95
	Rural	1,596	784	1,525	3,905	4,299	91	4,547	86
	Total	2,425	1,004	1,525	4,954	5,348	93	5,657	88
Pidigan	Urban	0	980	1,638	2,618	2,655	99	2,809	93
	Rural	0	732	5,671	6,403	7,113	90	7,524	85
	Total	0	1,712	7,309	9,021	9,768	92	10,333	87
Pilar	Urban	1,000	178	0	1,178	1,303	90	1,378	85
	Rural	965	1,156	3,587	5,708	7,660	75	8,103	70
	Total	1,965	1,334	3,587	6,886	8,963	77	9,481	73
Salapadan	Urban	0	660	0	660	1,424	46	1,506	44
	Rural	0	2,614	0	2,614	3,892	67	4,117	63
	Total	0	3,274	0	3,274	5,316	62	5,623	58
San Isidro	Urban	0	240	285	525	552	95	584	90
	Rural	0	330	2,753	3,083	3,572	86	3,778	82
	Total	0	570	3,038	3,608	4,124	87	4,362	83
San Juan	Urban	0	216	877	1,093	1,329	82	1,406	78
	Rural	0	0	5,601	5,601	7,797	72	8,247	68
	Total	0	216	6,478	6,694	9,126	73	9,653	69
San Quintin	Urban	0	260	0	260	738	35	781	33
	Rural	0	1,665	889	2,554	3,968	64	4,197	61
	Total	0	1,925	889	2,814	4,706	60	4,978	57
Tayum	Urban	1,500	50	621	2,171	2,268	96	2,399	90
	Rural	520	2,227	5,332	8,079	9,569	84	10,122	80
	Total	2,020	2,277	5,953	10,250	11,837	87	12,521	82
Tineg	Urban	0	0	0	0	0	0	0	0
	Rural	0	1,215	0	1,215	3,109	39	3,289	37
	Total	0	1,215	0	1,215	3,109	39	3,289	37
Tubo	Urban	0	0	0	0	0	0	0	0
	Rural	1,215	1,814	0	3,029	5,111	59	5,406	56
	Total	1,215	1,814	0	3,029	5,111	59	5,406	56
Villavieja	Urban	0	520	236	756	788	96	834	91
	Rural	0	2,582	1,152	3,734	4,209	89	4,452	84
	Total	0	3,102	1,388	4,490	4,997	90	5,286	85
Provincial Total	Urban	17,798	6,749	18,611	43,158	47,471	91	50,214	86
	Rural	13,505	33,898	70,150	117,553	151,808	77	160,582	73
	Total	31,303	40,647	88,761	160,711	199,279	81	210,796	76

Table 8.2.3 Number of Households Served by Sanitary Toilets in the Base Year (1995)

Municipality	Area	1995			Households Using Sanitary Toilets in 1995				Recipient Uses of Planned/Ongoing Projects				Households Using Sanitary Toilets in Base Year (1995)					
		Population	HHs	Flush	Pour Flush	VIP	Total	Flush	Pour Flush	VIP	Total	Number				Coverage (%)		
												Flush	Pour Flush	VIP	Total	Flush	Pour Flush	VIP
Bangueled (Capital)	Urban	14,904	2,816	556	1,879	0	2,435	0	20	0	20	2,455	20	67	0	87		
	Rural	22,455	4,152	5	147	0	152	0	40	0	40	192	0	5	0	5		
	Total	37,359	6,968	561	2,026	0	2,587	0	60	0	60	2,647	60	5	0	38		
Boliney	Urban	770	139	7	13	0	20	0	0	0	0	20	5	9	0	15		
	Rural	3,424	630	2	93	0	95	0	0	0	0	95	0	15	0	15		
	Total	4,194	769	9	106	0	115	0	0	0	0	115	5	14	0	30		
Bucay	Urban	2,753	511	16	187	0	203	0	3	0	3	206	3	37	0	40		
	Rural	11,107	1,966	0	661	30	691	0	28	0	28	719	0	34	2	37		
	Total	13,860	2,477	16	848	30	894	0	31	0	31	925	31	35	1	37		
Bucloc	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Rural	2,120	379	5	100	30	135	0	0	0	0	135	1	26	8	36		
	Total	2,120	379	5	100	30	135	0	0	0	0	135	1	26	8	36		
Daguoman	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Rural	1,500	284	5	58	33	96	0	15	0	15	111	2	26	12	39		
	Total	1,500	284	5	58	33	96	0	15	0	15	111	2	26	12	39		
Dangus	Urban	1,555	302	3	198	10	211	0	18	0	18	229	1	68	3	73		
	Rural	1,701	334	6	286	100	395	0	26	0	26	421	1	49	16	66		
	Total	3,256	636	9	484	110	606	0	44	0	44	650	2	32	27	73		
Delores	Urban	1,867	375	19	210	0	232	0	0	0	0	232	5	56	1	62		
	Rural	7,395	1,346	9	623	0	621	0	30	0	30	651	1	47	1	48		
	Total	9,262	1,721	28	833	0	853	0	30	0	30	883	6	61	2	51		
Lakub	Urban	671	123	3	120	0	123	0	0	0	0	123	2	98	0	100		
	Rural	1,815	326	0	206	0	206	0	20	0	20	226	0	69	0	69		
	Total	2,486	449	3	326	0	329	0	20	0	20	349	2	77	0	78		
Langanghang	Urban	2,400	467	48	259	0	307	0	0	0	0	307	10	55	0	66		
	Rural	9,772	1,747	6	842	0	848	0	11	0	11	859	0	49	0	49		
	Total	12,172	2,214	54	1,101	0	1,155	0	11	0	11	1,166	2	50	0	53		
Lagayan	Urban	854	161	3	95	6	104	0	24	0	24	128	2	74	4	90		
	Rural	2,580	485	1	263	21	285	0	0	0	0	285	0	54	4	59		
	Total	3,434	646	4	358	27	389	0	24	0	24	413	2	59	4	64		
Langiden	Urban	350	74	5	56	0	61	0	13	0	13	74	7	93	0	100		
	Rural	2,206	454	2	205	0	207	0	0	0	0	207	0	45	0	45		
	Total	2,556	528	7	261	0	268	0	13	0	13	281	7	52	0	53		
La Paz	Urban	3,362	636	19	605	0	624	0	0	0	0	624	3	95	0	98		
	Rural	9,048	1,799	6	896	33	935	0	10	0	10	945	0	50	2	53		
	Total	12,410	2,437	25	1,501	33	1,559	0	10	0	10	1,569	3	62	1	64		
Linao	Urban	654	121	7	100	0	107	0	10	0	10	117	6	91	0	97		
	Rural	3,301	576	3	374	4	381	0	10	0	10	391	1	67	1	68		
	Total	3,955	697	10	474	4	488	0	20	0	20	494	7	71	1	73		
Luba	Urban	1,167	202	6	166	0	172	0	11	0	11	183	3	88	1	93		
	Rural	4,765	886	4	360	129	493	0	13	0	13	506	0	42	15	57		
	Total	5,932	1,088	10	526	131	667	0	24	0	24	691	3	51	12	62		



Table 8.2.3 Number of Households Served by Sanitary Toilets in the Base Year (1995) (Cont'd.)

Municipality	Area	1995				Households Using Sanitary Toilets in 1995				Recipient HHs of Planned/Ongoing Projects				Households Using Sanitary Toilets in Base Year (1995)			
		Population	HHs	Flush	Pour Flush	VIP	Total	Flush	Pour Flush	VIP	Total	Flush	Pour Flush	Number	VIP	Total	Coverage (%)
Matibong	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	3,705	632	34	188	148	370	0	0	0	0	34	188	188	148	370	5
	Total	3,705	632	34	188	148	370	0	0	0	0	34	188	188	148	370	5
Manabo	Urban	3,968	757	9	418	0	427	0	0	15	15	0	0	433	0	442	1
	Rural	4,515	891	5	512	4	521	0	0	15	15	0	0	527	4	536	1
	Total	8,483	1,648	14	930	4	948	0	0	30	30	0	0	960	8	968	2
Penarubia	Urban	1,049	191	120	41	25	186	0	0	5	5	0	0	120	25	145	13
	Rural	4,299	767	237	175	345	757	0	0	10	10	0	0	185	345	530	24
	Total	5,348	958	357	216	370	943	0	0	15	15	0	0	370	370	943	23
Pidiagan	Urban	2,655	476	63	363	0	426	0	0	0	0	0	0	63	0	63	13
	Rural	7,113	1,302	0	970	0	970	0	0	0	0	0	0	970	0	970	0
	Total	9,768	2,678	63	1,333	0	1,396	0	0	0	0	0	0	1,333	0	1,396	4
Pilar	Urban	1,303	246	16	83	0	99	0	0	40	40	0	0	16	0	139	7
	Rural	7,660	1,442	5	606	0	611	0	0	0	0	0	0	5	0	611	0
	Total	8,963	1,678	21	689	0	710	0	0	40	40	0	0	21	0	710	1
Sal-Lapidan	Urban	1,424	261	6	102	0	108	0	0	20	20	0	0	6	0	126	2
	Rural	3,892	710	0	479	99	578	0	0	0	0	0	0	0	99	598	0
	Total	5,316	971	6	581	99	686	0	0	20	20	0	0	6	99	686	1
San Isidro	Urban	552	91	2	75	0	77	0	0	4	4	0	0	2	0	81	2
	Rural	3,572	652	0	411	0	411	0	0	20	20	0	0	0	0	431	0
	Total	4,124	743	2	486	0	488	0	0	24	24	0	0	2	0	488	0
San Juan	Urban	1,329	278	18	205	0	223	0	0	0	0	0	0	18	0	223	6
	Rural	7,997	1,544	14	523	0	537	0	0	10	10	0	0	14	0	547	1
	Total	9,326	1,822	32	728	0	760	0	0	10	10	0	0	32	0	760	2
San Quintin	Urban	738	143	7	62	34	103	0	0	2	2	0	0	7	34	105	5
	Rural	3,968	789	5	178	302	485	0	0	8	8	0	0	5	302	493	1
	Total	4,706	932	12	240	336	588	0	0	10	10	0	0	12	336	588	1
Tayum	Urban	2,268	449	51	290	0	341	0	0	3	3	0	0	51	0	344	11
	Rural	9,569	1,686	117	1,085	0	1,202	0	0	7	7	0	0	117	0	1,209	7
	Total	11,837	2,135	168	1,375	0	1,543	0	0	10	10	0	0	168	0	1,543	8
Tineg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	3,109	578	14	158	34	206	0	0	20	20	0	0	14	34	226	2
	Total	3,109	578	14	158	34	206	0	0	20	20	0	0	14	34	206	2
Tubo	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	5,111	923	2	213	39	254	0	0	10	10	0	0	2	39	264	0
	Total	5,111	923	2	213	39	254	0	0	10	10	0	0	2	39	264	0
Villavieja	Urban	788	151	13	93	0	106	0	0	10	10	0	0	13	0	116	9
	Rural	4,209	796	2	474	0	476	0	0	20	20	0	0	2	0	496	0
	Total	4,997	947	15	567	0	582	0	0	30	30	0	0	15	0	582	2
Provincial Total	Urban	47,471	8,962	997	5,620	80	6,997	0	0	188	188	0	0	997	5,808	6,805	11
	Rural	151,808	28,076	480	19,468	1,350	12,707	0	0	335	335	0	0	480	1,350	13,042	2
	Total	199,279	37,038	1,476	16,488	1,430	19,404	0	0	523	523	0	0	1,476	1,430	19,927	4

Table 8.2.4 Number of Public School Students Served by School Toilets in Base Year (1995)

Municipality	1995 Total No. of Public School Students	Std. No. of Students that can be Served by 1995 Toilets	No. of Students to be Served by Planned/Ongoing Projects	Std. No. of Students that can be Served by Toilets in Base Year (1995)	Coverage (%)
Bangod (Capital)	6,690	2,550	0	2,550	38
Boliney	785	785	0	785	100
Bucay	4,472	1,800	0	1,800	40
Bucloc	358	100	0	100	28
Daguioman	367	367	0	367	100
Danglas	557	550	0	550	99
Dolores	1,617	1,300	0	1,300	80
Lacub	294	294	0	294	100
Lagangilang	2,254	2,254	0	2,254	100
Lagayan	955	955	0	955	100
Langiden	423	423	0	423	100
La Paz	2,146	750	0	750	35
Licuan	557	300	0	300	54
Luba	1,106	200	0	200	18
Malibcong	799	0	0	0	0
Manabo	1,949	600	0	600	31
Penarrubia	816	816	0	816	100
Pidigan	2,197	1,350	0	1,350	61
Pilar	2,268	700	0	700	31
Sal-lapadan	935	500	0	500	53
San Isidro	883	200	0	200	23
San Juan	2,264	1,400	0	1,400	62
San Quintin	870	850	0	850	98
Tayum	1,919	900	0	900	47
Tineg	818	0	0	0	0
Tubo	1,556	550	0	550	35
Villaviciosa	743	0	0	0	0
<b>Provincial Total</b>	<b>40,598</b>	<b>20,494</b>	<b>0</b>	<b>20,494</b>	<b>50</b>

Table 8.2.5 Number of Public Utilities with Sanitary Toilets in the Base Year (1995)

Municipality	Type	No. of PU in 1995	No. of PU with Sanitary Toilets in 1995	No. of PU in Planned/On-going Project	No. of PU with Sanitary Toilets in Planned/On-going Projects	No. of PU in Base Year 1995	No. of PU with Sanitary Toilets in Base year 1995
Bangued (Capital)	Public Market	1	1	0	0	1	1
	Bus/Jeep Terminal	5	5	0	0	5	5
	Total	6	6	0	0	6	6
Boliney	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Bucay	Public Market	1	1	0	0	1	1
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	1	1	0	0	1	1
Bucloc	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Daguiman	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Danglas	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Delores	Public Market	1	1	0	0	1	1
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	1	1	0	0	1	1
Lacub	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Lagangilang	Public Market	1	1	0	0	1	1
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	1	1	0	0	1	1
Lagayan	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0

Table 8.2.5 Number of Public Utilities with Sanitary Toilets in the Base Year (1995) (Cont'd.)

Municipality	Type	No. of PU in 1995	No. of PU with Sanitary Toilets in 1995	No. of PU in Planned/On-going Project	No. of PU with Sanitary Toilets in Planned/On-going Projects	No. of PU in Base Year 1995	No. of PU with Sanitary Toilets in Base year 1995
Langiden	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
La Paz	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Licuan	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Luba	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Malibcong	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Manobo	Public Market	1	1	0	0	1	1
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	1	1	0	0	1	1
Penarrubia	Public Market	1	1	0	0	1	1
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	1	1	0	0	1	1
Pidigan	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Pilar	Public Market	1	0	0	0	1	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	1	0	0	0	1	0
Salapadan	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0

Table 8.2.5 Number of Public Utilities with Sanitary Toilets in the Base Year (1995) (Cont'd.)

Municipality	Type	No. of PU in 1995	No. of PU with Sanitary Toilets in 1995	No. of PU in Planned/On-going Project	No. of PU with Sanitary Toilets in Planned/On-going Projects	No. of PU in Base Year 1995	No. of PU with Sanitary Toilets in Base year 1995
San Isidro	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
San Juan	Public Market	1	1	0	0	1	1
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	1	1	0	0	1	1
San Quintin	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Tayum	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Tineg	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Tubo	Public Market	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	0	0	0	0	0	0
Villavieja	Public Market	1	0	0	0	1	0
	Bus/Jeep Terminal	0	0	0	0	0	0
	Total	1	0	0	0	1	0
Provincial Total	Public Market	9	7	0	0	9	7
	Bus/Jeep Terminal	5	5	0	0	5	5
	Total	14	12	0	0	14	12

Note: PU - Public Utilities

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

Municipality	Area	No. of Household Served by Existing Facilities			Coverage in 1995										Coverage in 2000									
		Flush	Pour Flush	VIP Latrine	Total	No. of HHs	Served Households				%		Served Population		No. of HHs		Served Households				%			
							Flush	Pour Flush	VIP Latrine	Total	Number	%	Number	%	Flush	Pour Flush	VIP Latrine	Total	Number	%				
																					Flush	Pour Flush	VIP Latrine	Total
Bangueco (Capital)	Urban	556	1,899	0	2,455	2,816	20	67	0	87	12,966	87	2,975	19	64	0	83							
	Rural	5	187	0	192	4,123	0	5	0	5	1,123	5	4,399	0	4	0	4							
	Total	561	2,086	0	2,647	6,968	8	30	0	38	14,089	38	7,374	8	28	0	36							
Boliney	Urban	7	13	0	20	139	5	9	0	14	108	14	148	5	9	0	14							
	Rural	2	93	0	95	630	0	15	0	15	514	15	671	0	14	0	14							
	Total	9	106	0	115	769	1	14	0	15	622	15	819	1	13	0	14							
Bucay	Urban	16	190	0	206	511	3	37	0	40	1,101	40	519	3	35	0	38							
	Rural	0	689	30	719	1,966	0	35	2	37	4,110	37	2,098	0	33	1	34							
	Total	16	879	30	925	2,477	1	35	1	37	5,211	37	2,637	1	33	1	35							
Bucloc	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
	Rural	5	100	30	135	379	1	26	8	36	763	36	401	1	25	7	34							
	Total	5	100	30	135	379	1	26	8	36	763	36	401	1	25	7	34							
Daguoman	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
	Rural	5	73	33	111	294	2	26	12	39	585	39	299	2	24	11	37							
	Total	5	73	33	111	294	2	26	12	39	585	39	299	2	24	11	37							
Danglas	Urban	3	206	10	219	302	1	68	3	73	1,135	73	316	1	65	3	69							
	Rural	6	106	90	202	334	2	32	27	60	1,021	60	353	2	30	25	57							
	Total	9	312	100	421	636	1	49	16	66	2,156	66	669	1	47	15	63							
Dolores	Urban	19	210	3	232	375	5	36	1	62	1,158	62	395	5	53	1	59							
	Rural	9	653	9	671	1,346	1	47	1	48	3,550	48	1,422	1	45	1	46							
	Total	28	863	12	883	1,721	2	49	1	51	4,708	51	1,817	2	46	1	49							
Lacub	Urban	3	120	0	123	123	2	98	0	100	671	100	131	2	92	0	94							
	Rural	0	226	0	226	326	0	69	0	69	1,252	69	343	0	66	0	66							
	Total	3	346	0	349	449	1	77	0	78	1,923	78	474	1	73	0	74							
Laganglang	Urban	48	259	0	307	467	10	55	0	66	1,643	66	497	10	52	0	62							
	Rural	6	853	0	859	1,747	0	49	0	49	4,788	49	1,846	0	46	0	47							
	Total	54	1,112	0	1,166	2,214	2	50	0	53	6,431	53	2,343	2	47	0	50							
Lagayun	Urban	3	119	6	128	161	2	74	4	80	683	80	170	2	70	4	75							
	Rural	1	263	21	285	485	0	54	4	59	1,522	59	515	0	51	4	55							
	Total	4	382	27	413	646	0	54	4	64	2,205	64	685	1	56	4	60							
Langiden	Urban	5	69	0	74	74	2	93	0	100	350	100	77	6	90	0	96							
	Rural	2	205	0	207	454	0	45	0	46	1,015	46	476	0	43	0	43							
	Total	7	274	0	281	528	1	52	0	53	1,365	53	553	1	50	0	51							
La Paz	Urban	19	605	0	624	638	3	95	0	98	3,295	98	671	3	90	0	93							
	Rural	6	906	33	945	1,799	0	50	2	53	4,801	53	1,916	0	47	2	49							
	Total	25	1,511	33	1,569	2,437	1	62	1	64	8,096	64	2,587	1	58	1	61							
Lucuan	Urban	7	110	0	117	121	6	91	0	97	634	97	128	5	86	0	91							
	Rural	3	394	4	397	576	1	67	1	68	2,306	68	608	0	63	1	64							
	Total	10	504	4	508	697	1	71	1	73	2,940	73	736	1	67	1	69							
Lubo	Urban	6	177	2	185	202	3	88	1	92	1,074	92	213	3	83	1	87							
	Rural	4	373	129	506	886	0	42	15	57	2,716	57	934	0	40	14	54							
	Total	10	550	131	691	1,088	1	51	12	64	3,790	64	1,147	1	48	15	64							

Table 8.2.6 Household Coverage in Phase I Provided by Existing Facilities in the Base Year (Household Toilets) (Cont'd.)

Municipality	Area	No. of Household Served by Existing Facilities					Coverage in 1995										Coverage in 2000				
		Flush	Pour Flush	VIP Latrine	Total	No. of HHs	Served Households				No. of HHs	Served Population		Flush	Pour Flush	VIP Latrine	Served Households				
							%	Total	VIP Latrine	Total		Number	%				%	Total			
Malibcong	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Rural	34	188	148	370	632	370	5	30	23	59	2,186	59	664	5	28	22	56	22		
	Total	34	188	148	370	632	370	5	30	23	59	2,186	59	664	5	28	22	56	22		
	Urban	9	433	0	442	757	442	1	57	0	58	2,301	58	807	1	54	0	55	0		
	Rural	5	527	4	536	891	536	1	59	0	60	2,709	60	936	1	56	0	57	0		
Manabo	Total	14	960	4	978	1,648	978	2	58	0	59	5,010	59	1,743	2	55	0	56	0		
	Urban	120	46	25	191	191	191	63	24	13	100	1,049	100	202	59	23	12	95	12		
	Rural	237	185	345	767	767	767	31	24	45	100	4,299	100	812	29	23	42	94	42		
	Total	357	231	370	958	958	958	37	24	39	100	5,348	100	1,014	35	23	36	94	36		
	Urban	63	363	0	426	426	426	13	76	0	89	2,363	89	502	13	72	0	85	0		
Pidigan	Rural	0	970	0	970	1,302	970	0	75	0	75	5,335	75	1,368	0	71	0	71	0		
	Total	63	1,333	0	1,396	1,728	1,728	4	75	0	79	7,698	79	1,870	3	71	0	75	0		
	Urban	16	123	0	139	236	139	7	52	0	59	769	59	251	6	49	0	55	0		
	Rural	5	606	0	611	1,442	611	0	42	0	42	3,217	42	1,529	0	40	0	40	0		
	Total	21	729	0	750	1,678	1,678	1	43	0	45	3,986	45	1,780	1	41	0	42	0		
Sal-lapodan	Urban	6	122	0	128	261	128	2	47	0	49	698	49	274	2	45	0	47	0		
	Rural	0	499	99	598	710	598	710	0	70	14	84	3,269	84	749	0	67	13	80		
	Total	6	621	99	726	971	726	1	64	10	75	3,967	75	1,023	1	61	10	71	10		
	Urban	2	79	0	81	91	81	2	87	0	89	491	89	97	2	81	0	84	0		
	Rural	0	431	0	431	652	431	0	66	0	66	2,358	66	687	0	63	0	63	0		
San Isidro	Total	2	510	0	512	743	512	0	69	0	69	2,849	69	784	0	65	0	65	0		
	Urban	18	205	0	223	278	223	6	74	0	80	1,063	80	293	6	70	0	76	0		
	Rural	14	533	0	547	1,544	547	1	35	0	35	2,729	35	1,617	1	33	0	34	0		
	Total	32	738	0	770	1,822	770	2	41	0	42	3,792	42	1,910	2	39	0	40	0		
	Urban	7	64	34	105	143	105	5	45	24	73	539	73	150	5	43	23	70	23		
San Quintin	Rural	5	186	302	493	789	493	1	24	38	62	2,460	62	839	1	22	36	59	36		
	Total	12	250	336	598	932	598	1	27	36	64	2,999	64	989	1	25	34	60	34		
	Urban	51	293	0	344	449	344	11	65	0	77	1,746	77	470	11	62	0	73	0		
	Rural	117	1,092	0	1,209	1,686	1,209	7	65	0	72	6,890	72	1,776	7	61	0	68	0		
	Total	168	1,385	0	1,553	2,135	1,553	8	65	0	73	8,636	73	2,246	7	62	0	69	0		
Tineg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Rural	14	178	34	226	578	226	2	31	6	39	1,213	39	609	2	29	6	37	6		
	Total	14	178	34	226	578	226	2	31	6	39	1,213	39	609	2	29	6	37	6		
	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Rural	2	223	39	264	923	264	0	24	4	29	1,482	29	983	0	23	4	27	4		
Tubo	Total	2	223	39	264	923	264	0	24	4	29	1,482	29	983	0	23	4	27	4		
	Urban	13	103	0	116	151	116	9	68	0	77	607	77	160	8	64	0	73	0		
	Rural	2	404	0	406	796	406	0	62	0	62	2,610	62	840	0	59	0	59	0		
	Total	15	507	0	522	947	522	2	63	0	65	3,217	65	1,000	2	60	0	61	0		
	Urban	997	5,808	80	6,885	8,962	6,885	11	65	1	77	36,444	77	9,466	11	61	1	73	1		
Provincial Total	Rural	489	11,203	1,301	13,042	28,076	13,042	2	40	5	46	70,690	46	29,690	2	38	5	44	5		
	Total	1,486	17,011	1,410	19,927	37,038	19,927	4	46	4	54	107,267	54	39,156	4	43	4	44	4		

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

Municipality	Public Schools Toilets				Public Toilets						
	Std. No. of Students that can be Served by Base Year (1995)	Coverage in 1995		Coverage in 2000		Coverage in 1995			Coverage in 2000		
		Total No. of Public School Students	%	Total No. of Public School Students	%	No. of PU in Base Year	No. of PU with Sanitary Toilets in Base Year (1995)	%	No. of PU	No. of PU with Sanitary Toilets	%
Bangued (Capital)	2,550	6,690	38	7,851	32	6	6	100	6	6	100
Boliney	785	785	100	858	91	0	0	0	0	0	0
Bucay	1,800	4,472	40	4,916	37	1	1	100	1	1	100
Bucloc	100	358	28	391	26	0	0	0	0	0	0
Daguoman	367	367	100	402	91	0	0	0	0	0	0
Danglas	550	557	99	617	89	0	0	0	1	0	0
Dolores	1,300	1,617	80	1,846	70	1	1	100	1	1	100
Lacub	294	294	100	322	91	0	0	0	0	0	0
Lagangilang	2,254	2,254	100	2,711	83	1	1	100	1	1	100
Lagayan	955	955	100	1,027	93	0	0	0	0	0	0
Langiden	423	423	100	456	93	0	0	0	0	0	0
La Paz	750	2,146	35	2,493	30	0	0	0	0	0	0
Licuan	300	557	54	404	74	0	0	0	0	0	0
Luba	200	1,106	18	1,185	17	0	0	0	0	0	0
Malibcong	0	799	0	872	0	0	0	0	0	0	0
Manabo	600	1,949	31	2,134	28	1	1	100	1	1	100
Penarrubia	816	816	100	987	83	1	1	100	1	1	100
Pidigan	1,350	2,197	61	2,401	56	0	0	0	0	0	0
Pilar	700	2,268	31	2,442	29	1	0	0	1	0	0
Sal-lapadan	500	935	53	1,019	49	0	0	0	0	0	0
San Isidro	200	883	23	949	21	0	0	0	1	0	0
San Juan	1,400	2,264	62	2,461	57	1	1	100	1	1	100
San Quintin	850	870	98	971	88	0	0	0	1	0	0
Tayum	900	1,919	47	2,159	42	0	0	0	0	0	0
Tineg	0	818	0	884	0	0	0	0	0	0	0
Tubo	550	1,556	35	1,657	33	0	0	0	0	0	0
Villaviciosa	0	743	0	876	0	1	0	0	1	0	0
Provincial Total	20,494	40,598	50	45,291	45	14	12	86	17	12	71

Note: PU - Public Utilities



### 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	1980	1990	1980	1990
CAR	Population	914,432	1,146,191	194,423	360,423	720,009	785,768
	Growth Rate	2.3%		6.4%		0.9%	
Abra	Population	160,198	184,743	38,582	44,169	121,616	140,574
	Growth Rate	1.4%		1.4%		1.5%	
	Percentage 1/	17.5%	16.1%	19.8%	12.3%	16.9%	17.9%

Note: 1/ Provincial population percentage to regional population

During the census decade from 1980 to 1990, the following population development was observed:

- The province recorded 1.4% of average annual growth rate lower than the regional rate at 2.3%.
- Percentage of provincial population to the regional population slightly decreased from 17.5% in 1980 to 16.1% in 1990 affected by urban population behavior.

The region is classified as an out-migration group in the country. Lower growth rate of urban population in the province compared to that of the region coincides with the conservative economic activities in the province as discussed in Chapter 3.

###### 2) 1990 population distribution in urban and rural areas

The 1990 population census results conducted by NSO were reviewed in terms of population distribution to urban and rural areas. In application of 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.

##### (2) Review of NSO regional population projection mainly on growth rates and the demographic conditions presented in the 1992 Philippine Yearbook

**Table 8.3.2 Population Distribution in Urban and Rural Areas**

Municipality	Total Population	1990 Census Data	
		Urban	Rural
Bangued (Capital)	34,184	14,027	20,157
Boliney	3,773	730	3,043
Bucay	13,346	2,668	10,678
Bucloc	1,932	0	1,932
Daguioman	1,413	0	1,413
Danglas	3,042	1,432	1,610
Dolores	8,577	1,725	6,852
Lacub	2,326	620	1,706
Lagangilang	11,248	2,255	8,993
Lagayan	3,771	835	2,936
Langiden	2,452	343	2,109
La Paz	11,240	3,050	8,190
Licuan	3,697	635	3,062
Luba	5,563	1,015	4,548
Malibcong	3,494	0	3,494
Manabo	7,797	3,603	4,194
Peñarrubia	4,893	945	3,948
Pidigan	8,807	2,428	6,379
Pilar	8,451	1,266	7,185
Sal-Iapadan	4,941	1,277	3,664
San Isidro	3,744	496	3,248
San Juan	8,445	1,228	7,217
San Quintin	4,293	655	3,638
Tayum	11,045	2,174	8,871
Tineg	3,068	0	3,068
Tubo	4,589	0	4,589
Villaviciosa	4,612	762	3,850
<b>Provincial Total</b>	<b>184,743</b>	<b>44,169</b>	<b>140,574</b>

NSO projected population at regional level for the year 1995 and target years based on the 1990 population census considering some factors. In the study, annual growth rates on the projected population by the NSO with ten years interval were calculated in application of a simple compounded formula as described below:

$$P_n = P_o \times (1 + r)^n$$

where,  $P_n$ : Population in n-th year

$P_o$ : Population in the base year

$r$ : Annual population growth rate

$n$ : Growth period in year

Through the review of future regional population, it was learned that NSO projection coincides with the gradually declining annual growth rates; 1.79% from 1990 to 2000 and 1.23% from 2000 to 2010, while the last census decade from 1980 to 1990 recorded 2.28% (refer to Table 8.3.3). Thus, approximately 0.5% of the growth rate was discounted to every decade.

Review of "1992 Philippine Yearbook" delineated the following demographic characteristics of the region and province:

- The inter-regional migration pattern will continue as a major population development factor, however the migration rate will gradually decline through the future.
- The international migration, on the other hand, is insignificant to the population development.
- Fertility and mortality, another key factors of population growth, will moderately decline through the future, and the national family planning target set forth the family size to arrive at 4 persons/household by the year 2010.
- Population of the region and province belongs to low growth group in the country.

When the regional and provincial demographic characteristics are taken into account, the future provincial population is considered to remain under similar conditions as experienced in the last census decade, unless specific development takes place in the province.

### (3) Estimation of present population (1995)

The present population in 1995 was estimated applying 1980-1990 average annual growth rate of respective municipalities (broken down to urban and rural areas) assuming that the trend of past population development prevailed up to the present. Household size in 1995 is also assumed to be the same as that in 1990.

### (4) Projection of provincial population by target year

Provincial population was projected by target year as shown in Table 8.3.3 in application of declining percentages of growth rates referring to the discounted growth rate of regional population projection as follows:

- Population in 2000 was projected from the base year 1995 applying the annual growth rate of 1.13 % (21.5% discount to the growth rate of the province observed during the last census decade, 1980 to 1990).
- Population in 2010 with the base year of 2000 was projected applying the annual growth rate of 1.00 % (although the rate of 0.78 % was derived in application of 31.9% discount to the growth rate of the province adopted for the years 1996 to 2000, the annual growth rate of 1.00 % was employed as the minimum growth rate for planning purpose).

- Present profile of population distribution both in urban and rural areas is assumed to prevail through the future.
- Household size in the year 2000 is assumed to be the same as the 1990 population census results, while that in the year 2010 was assumed to be 4 persons/household 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**

	Growth Rate (%)				Population and Provincial Share in the Region		
	1980 - 1990	1991 - 1995	1996 - 2000	2000 - 2010	1990	2000	2010
CAR	2.28	1.79 (21.5)		1.23 (31.3)	1,146,191	1,396,000	1,577,000
Abra	1.44	1.44	1.13	1.00	184,743 16.1%	210,796 15.1%	232,849 14.8%

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

Table 8.3.4 shows provincial population by urban and rural area for the target years and the year 1995. Table 8.3.5 presents projected number of households for the target years.

**Table 8.3.4 Provincial Population for Target Years**

Area	Population/ Composition	1990	1995	2000	2010
Total	Population	184,743	199,279	210,796	232,849
Urban	Population	44,169	47,471	50,214	55,465
Area	Composition (%)	24	24	24	24
Rural	Population	140,574	151,808	160,582	177,384
Area	Composition (%)	76	76	76	76

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

Municipality	Household Size			Number of Households											
	1990			1990			1995			2000			2010		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Bangued (Capital)	5.3	5.4	5.4	2,650	3,727	6,377	2,816	4,152	6,968	2,975	4,399	7,374	4,353	6,559	10,912
Boliney	5.5	5.4	5.5	132	560	692	139	630	769	148	671	819	225	1,000	1,225
Bucay	5.4	5.6	5.6	495	1,890	2,385	511	1,966	2,477	539	2,098	2,637	804	3,245	4,049
Bucloc	0.0	5.6	5.6	0	345	345	0	379	379	0	401	401	0	620	620
Dagupan	0.0	5.3	5.3	0	268	268	0	284	284	0	299	299	0	438	438
Danglas	5.2	5.1	5.1	278	316	594	302	334	636	316	353	669	454	497	951
Dolores	5.0	5.5	5.4	347	1,247	1,594	375	1,346	1,721	395	1,422	1,817	546	2,160	2,706
Lacub	5.4	5.6	5.5	114	306	420	123	326	449	131	343	474	196	530	726
Lagangilang	5.3	5.6	5.5	423	1,608	2,031	467	1,747	2,214	497	1,846	2,343	728	2,855	3,583
Lagayan	5.3	5.3	5.3	157	552	709	161	485	646	170	515	685	249	754	1,003
Langiden	4.8	4.9	4.8	72	434	506	74	454	528	77	476	553	102	645	747
La Paz	5.3	5.0	5.1	579	1,626	2,205	638	1,799	2,437	671	1,916	2,587	982	2,646	3,628
Licuan	5.4	5.9	5.8	117	520	637	121	576	697	128	608	736	191	991	1,182
Luba	5.8	5.4	5.4	176	845	1,021	202	886	1,088	213	934	1,147	341	1,392	1,733
Malibcong	0.0	5.9	5.9	0	596	596	0	632	632	0	664	664	0	1,082	1,082
Manabo	5.2	5.1	5.1	687	828	1,515	757	891	1,648	807	936	1,743	1,159	1,319	2,478
Penarrubia	5.5	5.6	5.6	172	704	876	191	767	958	202	812	1,014	307	1,256	1,563
Pidigan	5.6	5.5	5.5	435	1,168	1,603	476	1,302	1,778	502	1,368	1,870	776	2,078	2,854
Pilar	5.5	5.3	5.3	229	1,353	1,582	236	1,442	1,678	251	1,529	1,780	381	2,238	2,619
Sal-lapadan	5.5	5.5	5.5	234	668	902	261	710	971	274	749	1,023	416	1,137	1,553
San Isidro	6.0	5.5	5.5	82	593	675	91	652	743	97	687	784	161	1,043	1,204
San Juan	4.8	5.1	5.0	257	1,429	1,686	278	1,544	1,822	293	1,617	1,910	388	2,278	2,666
San Quintin	5.2	5.0	5.1	127	723	850	143	789	932	150	839	989	216	1,159	1,375
Tayum	5.1	5.7	5.5	430	1,563	1,993	449	1,686	2,135	470	1,776	2,246	663	2,795	3,458
Tineg	0.0	5.4	5.4	0	570	570	0	578	578	0	609	609	0	908	908
Tubo	0.0	5.5	5.5	0	829	829	0	923	923	0	983	983	0	1,493	1,493
Villaviciosa	5.2	5.3	5.3	146	728	874	151	796	947	160	840	1,000	230	1,230	1,460
Provincial Total	5.3	5.4	5.4	8,339	25,996	34,335	8,962	28,076	37,038	9,466	29,690	39,156	13,868	44,348	58,216



### 8.3.3 Projection of the Number of Public Utilities

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

Municipality	Type	1995	2000		2010	
		No. of Public Utilities	Proposed Construction	Total	Proposed Construction	Total
Bangued (Capital)	Public Markets	1		1	1	2
	Bus/Jeep Term.	5		5		5
	Total	6	0	6	1	7
Boliney	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0
Bucay	Public Markets	1		1		1
	Bus/Jeep Term.	0		0		0
	Total	1	0	1	0	1
Bucloc	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0
Daguio	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0
Danglas	Public Markets	0	1	1		1
	Bus/Jeep Term.	0		0		0
	Total	0	1	1	0	1
Dolores	Public Markets	1		1		1
	Bus/Jeep Term.	0		0	1	1
	Total	1	0	1	1	2
Lacub	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0
Lagangilang	Public Markets	1		1		1
	Bus/Jeep Term.	0		0	1	1
	Total	1	0	1	1	2
Lagayan	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0
Langiden	Public Markets	0		0	1	1
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	1	1
La Paz	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0
Licuan	Public Markets	0		0	1	1
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	1	1
Luba	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0

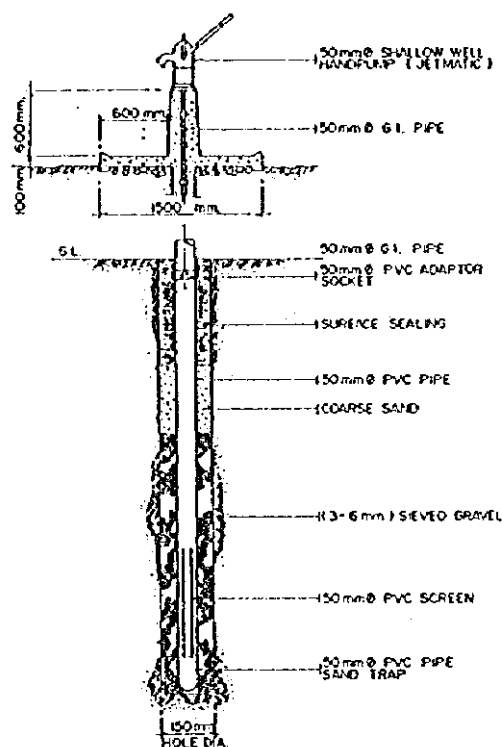
**Table 8.3.7 Projected Number of Public Utilities by Municipality by Target Year**  
(Cont.d)

Municipality	Type	1995	2000		2010	
		No. of Public Utilities	Proposed Construction	Total	Proposed Construction	Total
Malibcong	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0
Manabo	Public Markets	1		1		1
	Bus/Jeep Term.	0		0		0
	Total	1	0	1	0	1
Penarrubia	Public Markets	1		1		1
	Bus/Jeep Term.	0		0		0
	Total	1	0	1	0	1
Pidigan	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0
Pilar	Public Markets	1		1		1
	Bus/Jeep Term.	0		0		0
	Total	1	0	1	0	1
Sal-lapadan	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0
San Isidro	Public Markets	0	1	1		1
	Bus/Jeep Term.	0		0		0
	Total	0	1	1	0	1
San Juan	Public Markets	1		1		1
	Bus/Jeep Term.	0		0		0
	Total	1	0	1	0	1
San Quintin	Public Markets	0	1	1		1
	Bus/Jeep Term.	0		0		0
	Total	0	1	1	0	1
Tayum	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0
Tineg	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0
Tubo	Public Markets	0		0		0
	Bus/Jeep Term.	0		0		0
	Total	0	0	0	0	0
Villaviciosa	Public Markets	1		1		1
	Bus/Jeep Term.	0		0		0
	Total	1	0	1	0	1
Provincial Total	Public Markets	9	3	12	3	15
	Bus/Jeep Term.	5	0	5	2	7
	Total	14	3	17	5	22

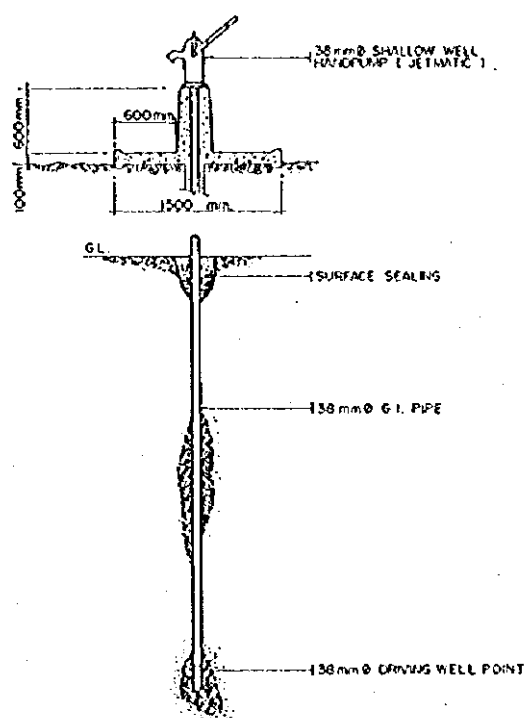


## 8.4 Types of Facilities and Implementation Criteria

### 8.4.1 Water Supply

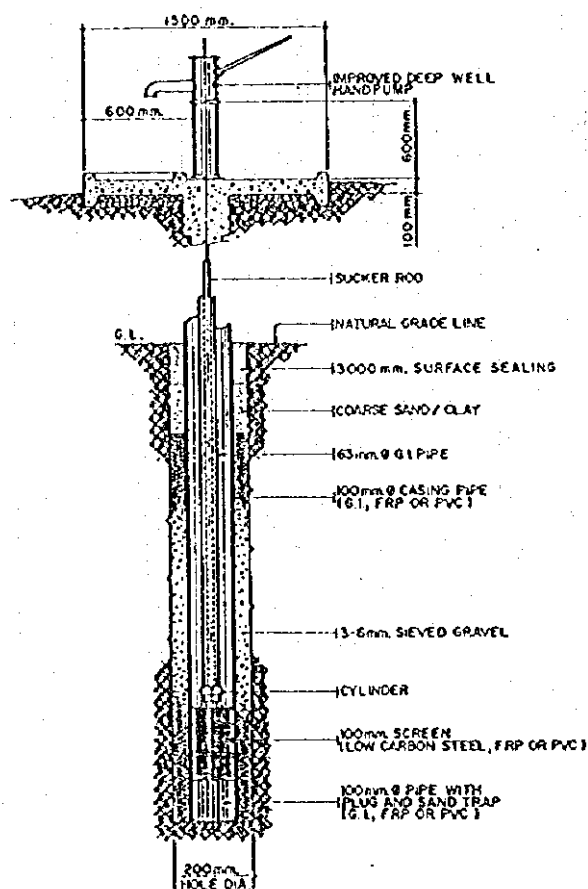


OPEN HOLE DRILLING & GRAVEL PACK METHOD

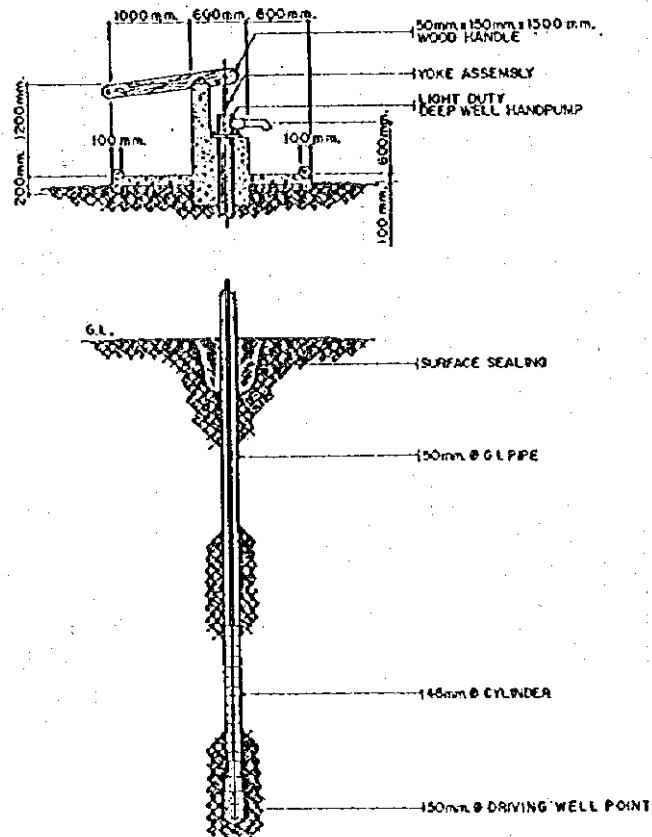


CONVENTIONAL DRIVING WELL POINT METHOD

## SHALLOW WELLS



OPEN HOLE DRILLING & GRAVEL PACK METHOD

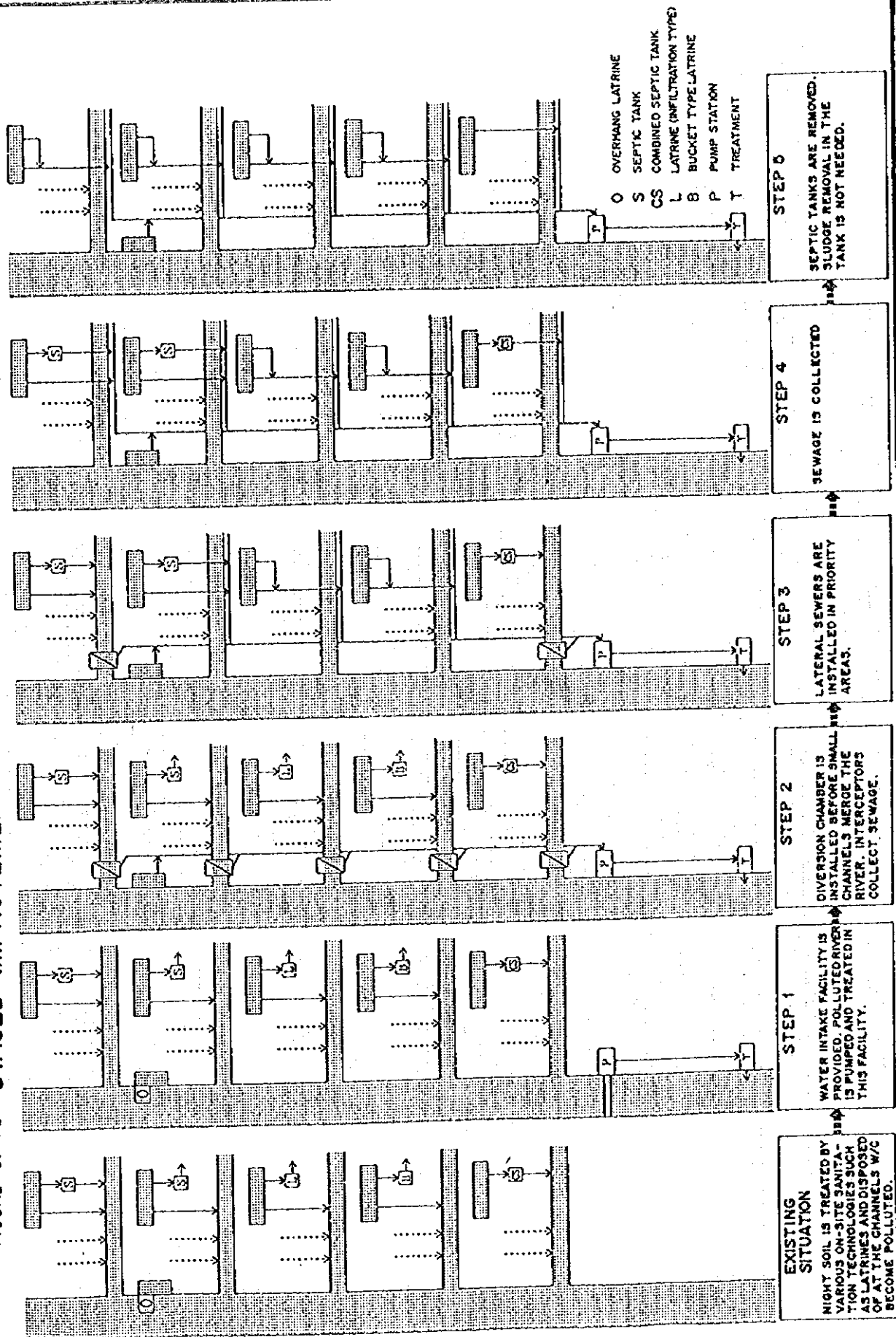


CONVENTIONAL DRIVING WELL POINT METHOD

## DEEP WELLS

FIGURE 8.4.1  
STANDARD STRUCTURE OF LEVEL 1 WELLS

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

Two (2) 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:

#### 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:

Two (2) untapped springs were considered to serve two (2) Level II systems in two (2) rural barangays of one (1) municipality.

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

Municipality	Number of Untapped Spring	Number of Barangay to be Served	Number of Households to be Served	Population to be Served
Bangued (Capital)	0	0	0	0
Boliney	0	0	0	0
Bucay	0	0	0	0
Bucloc	0	0	0	0
Daguioman	0	0	0	0
Danglas	0	0	0	0
Dolores	0	0	0	0
Lacub	0	0	0	0
Lagangilang	0	0	0	0
Lagayan	0	0	0	0
Langiden	0	0	0	0
La Paz	0	0	0	0
Licuan	0	0	0	0
Luba	0	0	0	0
Malibcong	0	0	0	0
Manabo	0	0	0	0
Peñarrubia	0	0	0	0
Pidigan	0	0	0	0
Pilar	0	0	0	0
Sal-lapadan	0	0	0	0
San Isidro	0	0	0	0
San Juan	0	0	0	0
San Quintin	0	0	0	0
Tayum	0	0	0	0
Tineg	0	0	0	0
Tubo	2	2	200	1,100
Villaviciosa	0	0	0	0
<b>Provincial Total</b>	<b>2</b>	<b>2</b>	<b>200</b>	<b>1,100</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 firstly 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 8.5.2 Population to be Served in Phase I (Water Supply)

Municipalities	Type	Population Served in the Base Year				Total Population	Service Coverage				Phase I Coverage (2000)				Additional Population to be Served			
		Level III			Total		Total	Level III			Level I	Level II	Level III	Level I	Level II	Level III	Total	
		Level III	Level II	Level I														
Bangued (Capital)	Urban	10,309	0	4,115	14,424	15,765	15,450	11,335	0	4,115	1,026	0	0	0	0	0	1,026	
	Rural	4,309	2,544	13,762	20,615	23,753	21,378	4,309	2,544	14,525	0	0	0	0	0	763	763	
	Total	14,618	2,544	17,877	35,039	39,518	36,828	15,644	2,544	18,640	1,026	0	0	0	0	763	1,789	
	Urban	675	35	0	710	814	798	763	35	0	88	0	0	0	0	0	88	
Boliney	Rural	2,265	340	0	2,605	3,622	3,260	2,265	340	655	0	0	0	0	0	655	655	
	Total	2,940	375	0	3,315	4,436	4,058	3,028	375	655	88	0	0	0	0	655	743	
	Urban	0	1,080	1,467	2,547	2,912	2,854	307	1,080	1,467	307	0	0	0	0	0	307	
	Rural	290	4,357	4,877	9,524	11,749	10,574	290	4,357	5,927	0	0	0	0	0	1,050	1,050	
Bucay	Total	290	5,437	6,344	12,071	14,661	13,428	597	5,437	7,394	307	0	0	0	0	1,050	1,357	
	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rural	0	1,008	0	1,008	2,243	2,019	0	1,008	1,011	0	0	0	0	0	1,011	1,011	
	Total	0	1,008	0	1,008	2,243	2,019	0	1,008	1,011	0	0	0	0	0	1,011	1,011	
Bucloc	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rural	0	1,008	0	1,008	2,243	2,019	0	1,008	1,011	0	0	0	0	0	1,011	1,011	
	Total	0	1,008	0	1,008	2,243	2,019	0	1,008	1,011	0	0	0	0	0	1,011	1,011	
	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Daguoman	Rural	0	610	0	610	1,587	1,428	0	610	818	0	0	0	0	0	818	818	
	Total	0	610	0	610	1,587	1,428	0	610	818	0	0	0	0	0	818	818	
	Urban	0	364	1,157	1,521	1,645	1,612	91	364	1,157	91	0	0	0	0	0	91	
	Rural	215	712	641	1,568	1,799	1,619	215	712	692	0	0	0	0	0	51	51	
Danglas	Total	215	1,076	1,798	3,089	3,444	3,231	306	1,076	1,849	91	0	0	0	0	51	142	
	Urban	1,250	0	595	1,845	1,975	1,936	1,341	0	595	91	0	0	0	0	0	91	
	Rural	125	579	6,466	7,170	7,822	7,170	125	579	6,466	0	0	0	0	0	0	0	
	Total	1,375	579	7,061	9,015	9,797	9,106	1,466	579	7,061	91	0	0	0	0	0	91	
Dolores	Urban	0	324	0	324	710	696	372	324	0	372	0	0	0	0	0	372	
	Rural	0	476	382	858	1,920	1,728	0	476	1,252	0	0	0	0	0	870	870	
	Total	0	800	382	1,182	2,630	2,424	372	800	1,252	372	0	0	0	0	870	1,242	
	Urban	1,025	0	1,206	2,231	2,634	2,581	1,375	0	1,206	350	0	0	0	0	0	350	
Lagangiang	Rural	435	0	6,531	6,966	10,337	9,303	435	0	8,868	0	0	0	0	0	2,337	2,337	
	Total	1,460	0	7,737	9,197	12,971	11,884	1,810	0	10,074	350	0	0	0	0	2,337	2,687	

Table 8.5.2 Population to be Served in Phase I (Water Supply) (Cont'd.)

Municipalities	Type	Population Served in the Base Year				Phase I Coverage (2000)					Additional Population to be Served			
		Population Served in the Base Year				Service Coverage					Additional Population to be Served			
		Level III	Level II	Level I	Total	Total Population	Total	Level III	Level II	Level I	Level III	Level II	Level I	Total
Lagayan	Urban	0	0	594	594	903	885	291	0	594	291	0	0	291
	Rural	0	531	318	849	2,729	2,456	0	531	1,925	0	0	1,607	1,607
	Total	0	531	912	1,443	3,632	3,341	291	531	2,519	291	0	1,607	1,898
Langiden	Urban	0	120	220	340	370	363	23	120	220	23	0	0	23
	Rural	0	221	1,894	2,115	2,334	2,115	0	221	1,894	0	0	0	0
	Total	0	341	2,114	2,455	2,704	2,478	23	341	2,114	23	0	0	23
La Paz	Urban	0	0	3,089	3,089	3,556	3,485	396	0	3,089	396	0	0	396
	Rural	0	0	6,835	6,835	9,582	8,624	0	0	8,624	0	0	1,789	1,789
	Total	0	0	9,924	9,924	13,138	12,109	396	0	11,713	396	0	1,789	2,185
Licuan	Urban	395	190	0	585	692	678	488	190	0	93	0	0	93
	Rural	965	1,198	0	2,163	3,587	3,228	965	1,198	1,065	0	0	1,065	1,065
	Total	1,360	1,388	0	2,748	4,279	3,906	1,453	1,388	1,065	93	0	1,065	1,158
Luba	Urban	815	116	0	931	1,234	1,209	1,093	116	0	278	0	0	278
	Rural	605	1,139	0	1,744	5,041	4,537	605	1,139	2,793	0	0	2,793	2,793
	Total	1,420	1,255	0	2,675	6,275	5,746	1,698	1,255	2,793	278	0	2,793	3,071
Matibcong	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	2,845	0	2,845	3,919	3,527	0	2,845	682	0	0	682	682
	Total	0	2,845	0	2,845	3,919	3,527	0	2,845	682	0	0	682	682
Manabo	Urban	0	1,196	2,511	3,707	4,197	4,113	406	1,196	2,511	406	0	0	406
	Rural	0	2,219	1,934	4,153	4,776	4,298	0	2,219	2,079	0	0	145	145
	Total	0	3,415	4,445	7,860	8,973	8,411	406	3,415	4,590	406	0	145	551
Penarrubia	Urban	829	220	0	1,049	1,110	1,088	868	220	0	39	0	0	39
	Rural	1,596	784	1,525	3,905	4,547	4,092	1,596	784	1,712	0	0	187	187
	Total	2,425	1,004	1,525	4,954	5,657	5,180	2,464	1,004	1,712	39	0	187	226
Pidigan	Urban	0	980	1,638	2,618	2,809	2,753	135	980	1,638	135	0	0	135
	Rural	0	732	5,671	6,403	7,524	6,772	0	732	6,040	0	0	369	369
	Total	0	1,712	7,309	9,021	10,333	9,525	135	1,712	7,678	135	0	369	504
Pilar	Urban	1,000	178	0	1,178	1,378	1,350	1,172	178	0	172	0	0	172
	Rural	965	1,156	3,587	5,708	8,103	7,293	965	1,156	5,172	0	0	1,585	1,585
	Total	1,965	1,334	3,587	6,886	9,481	8,643	2,137	1,334	5,172	172	0	1,585	1,757

Table 8.5.2 Population to be Served in Phase I (Water Supply) (Cont'd.)

Municipalities	Type	Population Served in the Base Year				Phase I Coverage (2000)				Additional Population to be Served			
		Population				Service Coverage				Population			
		Level III	Level II	Level I	Total	Total	Level III	Level II	Level I	Level III	Level II	Level I	Total
Sal-lapadan	Urban	0	660	0	660	1,506	816	660	0	816	0	0	816
	Rural	0	2,614	0	2,614	4,117	3,705	0	2,614	1,091	0	1,091	1,091
	Total	0	3,274	0	3,274	5,623	5,181	816	3,274	1,091	816	1,091	1,907
San Isidro	Urban	0	240	285	525	584	572	47	240	285	47	0	47
	Rural	0	330	2,753	3,083	3,778	3,400	0	330	3,070	0	317	317
	Total	0	570	3,038	3,608	4,362	3,972	47	570	3,355	47	317	364
San Juan	Urban	0	216	877	1,093	1,406	1,378	285	216	877	285	0	285
	Rural	0	0	5,601	5,601	8,247	7,422	0	0	7,422	0	1,821	1,821
	Total	0	216	6,478	6,694	9,653	8,800	285	216	8,299	285	1,821	2,106
San Quintin	Urban	0	260	0	260	781	765	505	260	0	505	0	505
	Rural	0	1,665	889	2,554	4,197	3,777	0	1,665	2,112	0	1,223	1,223
	Total	0	1,925	889	2,814	4,978	4,542	505	1,925	2,112	505	1,223	1,728
Tayum	Urban	1,500	50	621	2,171	2,399	2,351	1,680	50	621	180	0	180
	Rural	520	2,227	5,332	8,079	10,122	9,110	520	2,227	6,363	0	1,031	1,031
	Total	2,020	2,277	5,953	10,250	12,521	11,461	2,200	2,277	6,984	180	1,031	1,211
Tineg	Urban	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	1,215	0	1,215	3,289	2,960	0	1,215	1,745	0	1,745	1,745
	Total	0	1,215	0	1,215	3,289	2,960	0	1,215	1,745	0	1,745	1,745
Tubo	Urban	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	1,215	1,814	0	3,029	5,406	4,865	1,215	2,914	736	0	736	1,836
	Total	1,215	1,814	0	3,029	5,406	4,865	1,215	2,914	736	0	736	1,836
Villaviciosa	Urban	0	520	236	756	834	817	61	520	236	61	0	61
	Rural	0	2,582	1,152	3,734	4,452	4,007	0	2,582	1,425	0	273	273
	Total	0	3,102	1,388	4,490	5,286	4,824	61	3,102	1,661	61	273	334
Provincial Total	Urban	17,798	6,749	18,611	43,158	50,214	49,210	23,850	6,749	18,611	6,052	0	6,052
	Rural	13,505	33,398	70,150	117,553	160,582	144,667	13,505	34,998	96,164	0	1,100	27,114
	Total	31,303	40,647	88,761	160,711	210,796	193,877	37,355	41,747	114,775	6,052	1,100	33,166

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

Municipalities	Type	Population Served in 2000				Phase II Coverage (2010)					Additional Population to be Served				
		Level III	Level II	Level I	Total	Total Population	Service Coverage				Additional Population to be Served				
							Total	Level III	Level II	Level I	Level III	Level II	Level I	Total	
Bangued (Capital)	Urban	11,335	0	4,115	15,450	17,413	17,065	17,065	0	0	5,730	0	0	5,730	
	Rural	4,309	2,544	14,525	21,378	26,237	24,925	4,309	2,544	18,072	0	0	3,547	3,547	
	Total	15,644	2,544	18,640	36,828	43,650	41,990	21,374	2,544	18,072	5,730	0	3,547	9,277	
Boliney	Urban	763	35	0	798	899	881	881	0	0	118	0	0	118	
	Rural	2,265	340	655	3,260	4,001	3,801	2,265	340	1,196	0	0	541	541	
	Total	3,028	375	655	4,058	4,900	4,682	3,146	340	1,196	118	0	541	659	
Bucay	Urban	307	1,080	1,467	2,854	3,217	3,153	3,153	0	0	2,846	0	0	2,846	
	Rural	290	4,357	5,927	10,574	12,978	12,329	290	4,357	7,682	0	0	1,755	1,755	
	Total	597	5,437	7,394	13,428	16,195	15,482	3,443	4,357	7,682	2,846	0	1,755	4,601	
Bucloc	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rural	0	1,008	1,011	2,019	2,478	2,354	0	1,008	1,346	0	0	335	335	
	Total	0	1,008	1,011	2,019	2,478	2,354	0	1,008	1,346	0	0	335	335	
Daguio	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rural	0	610	818	1,428	1,753	1,665	0	610	1,055	0	0	237	237	
	Total	0	610	818	1,428	1,753	1,665	0	610	1,055	0	0	237	237	
Danglas	Urban	91	364	1,157	1,612	1,817	1,781	1,781	0	0	1,690	0	0	1,690	
	Rural	215	712	692	1,619	1,987	1,888	215	712	961	0	0	269	269	
	Total	306	1,076	1,849	3,231	3,804	3,669	1,996	712	961	1,690	0	269	1,959	
Dolores	Urban	1,341	0	595	1,936	2,182	2,138	2,138	0	0	797	0	0	797	
	Rural	125	579	6,466	7,170	8,640	8,208	125	579	7,504	0	0	1,038	1,038	
	Total	1,466	579	7,061	9,106	10,822	10,346	2,263	579	7,504	797	0	1,038	1,835	
Lacub	Urban	372	324	0	696	784	768	768	0	0	396	0	0	396	
	Rural	0	476	1,252	1,728	2,121	2,015	0	476	1,539	0	0	287	287	
	Total	372	800	1,252	2,424	2,905	2,783	768	476	1,539	396	0	287	683	
Lugangilang	Urban	1,375	0	1,206	2,581	2,910	2,852	2,852	0	0	1,477	0	0	1,477	
	Rural	435	0	8,868	9,303	11,418	10,847	435	0	10,412	0	0	1,544	1,544	
	Total	1,810	0	10,074	11,884	14,328	13,699	3,287	0	10,412	1,477	0	1,544	3,021	



Table 8.5.3 Population to be Served in Phase II (Water Supply) (Cont'd.)

Municipalities	Type	Population Served in 2000				Phase II Coverage (2010)				Additional Population to be Served			
		Level III			Total	Service Coverage			Total Population	Level I			Total
		Level III	Level II	Level I		Level III	Level II	Level I		Level III	Level II	Level I	
Lagayan	Urban	291	0	594	885	977	977	0	977	686	0	0	686
	Rural	0	531	1,925	2,456	2,864	0	531	2,864	0	0	408	408
	Total	291	531	2,519	3,341	3,841	977	531	3,841	686	0	408	1,094
Langiden	Urban	23	120	220	363	401	401	0	401	378	0	0	378
	Rural	0	221	1,894	2,115	2,449	0	221	2,449	0	0	334	334
	Total	23	341	2,114	2,478	2,850	401	221	2,850	378	0	334	712
La Paz	Urban	396	0	3,089	3,485	3,928	3,849	0	3,928	3,453	0	0	3,453
	Rural	0	0	8,624	8,624	10,585	0	0	10,585	0	0	1,432	1,432
	Total	396	0	11,713	12,109	14,513	3,849	0	14,513	3,453	0	1,432	4,885
Lucuan	Urban	488	190	0	678	764	749	0	764	261	0	0	261
	Rural	965	1,198	1,065	3,228	3,963	965	1,198	3,963	0	0	537	537
	Total	1,453	1,388	1,065	3,906	4,727	1,714	1,198	4,727	261	0	537	798
Luba	Urban	1,093	116	0	1,209	1,336	1,336	0	1,336	243	0	0	243
	Rural	605	1,139	2,793	4,537	5,569	605	1,139	5,569	0	0	754	754
	Total	1,698	1,255	2,793	5,746	6,932	1,941	1,139	6,932	243	0	754	997
Malibcong	Urban	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	2,845	682	3,527	4,329	4,113	0	4,329	0	0	586	586
	Total	0	2,845	682	3,527	4,329	4,113	0	4,329	0	0	586	586
Manabo	Urban	406	1,196	2,511	4,113	4,636	4,543	0	4,636	4,137	0	0	4,137
	Rural	0	2,219	2,079	4,298	5,276	5,012	0	5,276	0	0	714	714
	Total	406	3,415	4,590	8,411	9,912	9,555	0	9,912	4,137	0	714	4,851
Penarrubia	Urban	868	220	0	1,088	1,226	1,201	0	1,226	333	0	0	333
	Rural	1,596	784	1,712	4,092	5,023	4,772	1,596	5,023	0	0	680	680
	Total	2,464	1,004	1,712	5,180	6,249	5,973	1,596	6,249	333	0	680	1,013
Pidigan	Urban	135	980	1,638	2,753	3,103	3,041	0	3,103	2,906	0	0	2,906
	Rural	0	732	6,040	6,772	8,311	7,895	0	8,311	0	0	1,123	1,123
	Total	135	1,712	7,678	9,525	11,414	10,936	0	11,414	2,906	0	1,123	4,029
Pilar	Urban	1,172	178	0	1,350	1,522	1,492	0	1,522	320	0	0	320
	Rural	965	1,156	5,172	7,293	8,951	8,503	1,156	8,951	0	0	1,210	1,210
	Total	2,137	1,334	5,172	8,643	10,473	9,995	1,156	10,473	320	0	1,210	1,530

Table 8.5.3 Population to be Served in Phase II (Water Supply) (Cont'd.)

Municipalities	Type	Population Served in 2000				Phase II Coverage (2010)					Additional Population to be Served			
		Population Served in 2000			Total	Service Coverage				Total Population	Service Coverage			
		Level III	Level II	Level I		Total	Level III	Level II	Level I		Level III	Level II	Level I	Total
Sal-lapadan	Urban	816	660	0	1,476	1,663	1,630	1,630	0	0	814	0	0	814
	Rural	0	2,614	1,091	3,705	4,548	4,321	0	2,614	1,707	0	0	616	616
	Total	816	3,274	1,091	5,181	6,211	5,951	1,630	2,614	1,707	814	0	616	1,430
San Isidro	Urban	47	240	285	572	645	632	632	0	0	585	0	0	585
	Rural	0	330	3,070	3,400	4,173	3,964	0	330	3,634	0	0	564	564
	Total	47	570	3,355	3,972	4,818	4,596	632	330	3,634	585	0	564	1,149
San Juan	Urban	285	216	877	1,378	1,553	1,522	1,522	0	0	1,237	0	0	1,237
	Rural	0	0	7,422	7,422	9,110	8,655	0	0	8,655	0	0	1,233	1,233
	Total	285	216	8,299	8,800	10,663	10,177	1,522	0	8,655	1,237	0	1,233	2,470
San Quintin	Urban	505	260	0	765	863	846	846	0	0	341	0	0	341
	Rural	0	1,665	2,112	3,777	4,636	4,404	0	1,665	2,739	0	0	627	627
	Total	505	1,925	2,112	4,542	5,499	5,250	846	1,665	2,739	341	0	627	968
Tayum	Urban	1,680	50	621	2,351	2,650	2,597	2,597	0	0	917	0	0	917
	Rural	520	2,227	6,363	9,110	11,181	10,622	520	2,227	7,875	0	0	1,512	1,512
	Total	2,200	2,277	6,984	11,461	13,831	13,219	3,117	2,227	7,875	917	0	1,512	2,429
Tineg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	1,215	1,745	2,960	3,633	3,451	0	1,215	2,236	0	0	491	491
	Total	0	1,215	1,745	2,960	3,633	3,451	0	1,215	2,236	0	0	491	491
Tubo	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	1,215	2,914	736	4,865	5,972	5,673	1,215	2,914	1,544	0	0	808	808
	Total	1,215	2,914	736	4,865	5,972	5,673	1,215	2,914	1,544	0	0	808	808
Villavieja	Urban	61	520	236	817	921	903	903	0	0	842	0	0	842
	Rural	0	2,582	1,425	4,007	4,918	4,672	0	2,582	2,090	0	0	665	665
	Total	61	3,102	1,661	4,824	5,839	5,575	903	2,582	2,090	842	0	665	1,507
Provincial Total	Urban	23,850	6,749	18,611	49,210	55,465	54,357	54,357	0	0	30,507	0	0	30,507
	Rural	13,505	34,998	96,164	144,667	177,384	168,514	13,505	34,998	120,011	0	0	23,847	23,847
	Total	37,355	41,747	114,775	193,877	232,849	222,871	67,862	34,998	120,011	30,507	0	23,847	54,354