

Table 8.2.5 Base Year Service Coverage of Municipal Solid Waste System in 1997

Municipality/ City	Total No. of Households	No. of Urban Households	No. of Households Served	Coverage of Households (%)	Coverage of Urban Households (%)
Alubijid	4,813	1,198	816	17	68
Balingasag	8,913	2,410	128	1	5
Balingoan	1,518	687			
Binuangan	1,070	276			
Claveria	7,919	3,597	442	6	12
El Salvador	6,603	1,219	781	12	64
Gingog City	17,519	6,197	13,708	78	100
Gitagum	2,360	451			
Initao	4,894	1,298	73	1	6
Jasaan	6,700	3,968	1,486	22	37
Kinoguitan	2,042	351			
Lagonglong	3,087	654	230	7	35
Laguindingan	3,498	510			
Libertad	1,884	724			
Lugait	2,970	1,284	1,432	48	100
Magsaysay	4,687	294	212	5	72
Manticao	4,608	1,302	831	18	64
Medina	4,507	1,109			
Naawan	3,100	632	339	11	54
Opol	5,098	1,435	1,714	34	100
Salay	3,864	1,348			
Sugbongcogon	1,310	668			
Tagoloan	8,477	8,477			
Talisayan	3,889	824			
Villanueva	4,513	2,012	575	13	29
<b>Provincial Total</b>	<b>119,843</b>	<b>42,925</b>	<b>22,767</b>	<b>19</b>	<b>53</b>

### 8.3 Projection of Frame Values

#### 8.3.1 Population Projection

Future population for all municipalities by urban and rural area was projected for the target years 2003 and 2010 together with the present population in 1997 as the planning base year.

The regional population in the future is published by the NSO, while the projection at provincial and municipal levels was not available during the time of the study. The future population of LGUs was therefore projected (details are included in the Supporting Report). At present, the available information for the study is as follows:

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

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

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

In the regional population projection, Region X and XI are classified as medium-sized regions. The following are the result of projection for the two regions in 2000, 2005 and 2010.

**Table 8.3.1 Regional Population Projection**

Year		1980	1990	1995	2000	2005	2010
Region X	Population	2,758,985	3,509,753	3,938,252	4,441,739	4,955,545	5,465,272
	Growth	-	2.44 %	2.33 %	2.44 %	2.21 %	1.98 %
Region X (Revised)	Population	1,765,120	2,197,554	2,472,947	2,737,148	NA	NA
	Growth	-	2.22 %	2.39 %	2.05 %	NA	NA
Region IX	Population	3,346,803	4,458,829	5,052,730	5,749,821	6,456,464	7,146,889
	Growth	-	2.91 %	2.53 %	2.62 %	2.35 %	2.05 %

Notes: Region X (Revised) excludes CARAGA Region. NA: Not Available  
Growth rates of Region X and Region X (Revised) from 1990 to 2000 are projected at 2.38% and 2.22%, respectively.

The growth rates from 1980-1995 between Region X (previous composition of the provinces used by the NSO) and recently arranged Region X (excluding the provinces in the CARAGA Region) are almost the same. The growth rate (2.22%) of revised Region X adopted from 1990 to 2000 is the same as that experienced from 1980 to 1990 (10 years). However, the growth rates between 1990 and 1995, and 1995 and 2000 become 2.39% and 2.05% respectively, as a result of 1995 census.

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

The provincial total population and of the component municipalities for the year 2002 were projected with 1990 as the base year. The modified provincial growth rates, which refer to the experience between 1980 and 1990 are adopted for the projection. This is applying the linear formula of  $P_n = P_0 \times (1+nr)$ . The provincial growth rate (excluding Cagayan de Oro City) used in the Land Use Plan is 1.36%.

While, the growth rate between 1980 and 1990 using the formula  $P_n = P_0 \times (1+r)^n$  is computed at 1.28%. On the other hand, the recorded/ projected growth rate of Region X (excluding CARAGA Region) from 1980 to 1990 and from 1990 to 2000 is 2.22 %

Comparing the census and the projected population in 1995, the provincial population based on the census is 12 % higher than the projected one. The growth rate from 1990 to 1995 was increased from the previous 1.36% to 2.36% (applying linear formula). Thus, it is recommended to use the recently experienced growth rates for the medium-term projection (either using linear or simple compounded formula). Regarding the municipal population in 1995, all the municipalities/city increased their average growth rates from 1990. The differences between actual and projected population ranged from 1 to 25%. In this connection, municipal growth rates experienced between 1990 and 1995 may be applied for the medium-term plan to reflect in the current trend.

### (3) Population Projection of the Province

In this study, a simple compounded formula;  $P_n = P_0 \times (1+r)^n$  is applied, which is used in the land use plan of other provinces.

Where;  $P_n$ : Population in "n"th year  $P_0$ : Population in base year

n: "n"th year from base year: Growth rate

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

#### Provincial Population

1) The regional population (Region X including CARAGA Region at present) projected by the NSO for the year 2010 is referred to, as the fixed frame of the Region. The following are population ratios of the province to the Region from 1980 to 1995 and for the year 2003 (provincial population is projected, with 1995 as base year, using a simple compounded growth rate from 1990 to 1995). The provincial population in 2002 is projected in the Land Use Plan.

Year	1980	1990	1995	2002	2003
Province	462,720	525,453	587,551	674,026	702,574
Region	2,758,985	3,509,753	3,938,252	4,647,150	4,749,853
P/R	16.8%	15.0%	14.9%	14.5%	14.8%

The provincial ratio to the region is stable with a range of 15% to 17%. The population share of the province to the regional total in the long-term period is assumed to be 15%. Therefore, the population in 2010 is set up at 819,791 (15 % of regional population 5,465,272).

Based on the above study, the growth rate experienced during the period 1990 to 1995 (2.26 %) is basically applied for the medium-term (1995-2003) projection with 1995 as base year. For the long-term projection from 2004 to 2010, provincial average growth rate of 2.23 % was estimated applying the aforementioned manner of projection. This figure is slightly higher than the regional average growth rate (1.98%). The projected population for the years 1997, 2003 and 2010 is summarized as follows:

<u>Year</u>	<u>Population</u>	<u>Growth Rate</u>
1995	587,551	Census result
1997	614,408	2.26 % (1990-1995 Census)
2003	702,574	2.26 % (1990-1995 Census)
2010	819,791	2.23 % (estimated from projected population in 2010)

#### Municipal population

The total population of the province by target year is fixed.

The growth rates of respective municipalities for the years 1997 and 2003 are determined referring to the development trend between 1990 and 1995 (a simple compounded formula). The municipal population for the respective target years was finally adjusted according to the initially calculated population sizes to meet the fixed provincial population. Accordingly, the growth rates of municipalities were modified. Table 8.3.2 presents the calculation results under the above conditions/assumptions.

For the year 2010 in the long-term, it is assumed that the trend of population growth of the respective municipalities between 1990 and 2002, which is considered in the Land Use Plan, will be realized in line with the land use plan of the province. Thus, the growth rates of the municipal population between 1990 and 2002 (projected figure in the Land Use Plan) are calculated using a simple compounded formula in order to apply for the projection in 2010 from the year 2003.

In the Land Use Plan, the population of three municipalities for the year 2002 (Lagonlong, Magsaysay and Sugbongcogon) is arranged to use the same figures in 1990, since the population of these municipalities was reduced from 1980 to 1990. However, referring to the 1995 census result, growth rates of the relevant municipalities from 1990 to 1995 had increased with a range of 1.4-3.7 % (using compounded formula). Under the population development on these municipalities in the recent census, the provincial average growth rate (2.23% by using compounded formula) from 2003 to 2010 is commonly employed to these municipalities.

Table 8.3.3 shows the study process result and the projected population by municipality for the year 2010 and adjusted growth rates.

**Table 8.3.2 Municipal Population Projection for Year 1997 and 2003**

Municipality	Annual Growth Rate (%)			Population (person)/Growth Rate				
	'80-'90	Land Use Plan	'90-'95	1995	1997	Estimated G.R (%)	2003	Estimated G.R (%)
Alubijid	2.38	3.36	2.19	21,765	22,706	2.14	25,685	2.09
Balingasag	0.79	1.39	2.09	46,018	47,913	2.04	53,882	1.99
Balingoan	0.14	0.50	2.45	7,548	7,914	2.40	9,090	2.35
Binaungan	1.34	1.84	1.09	5,374	5,486	1.04	5,816	0.99
Claveria	0.68	1.14	4.62	39,020	42,665	4.57	55,572	4.52
El Salvador	2.71	3.68	3.35	31,500	33,612	3.30	40,686	3.25
Gingoog City	0.33	0.61	1.17	87,530	89,499	1.12	95,328	1.07
Gitagum	1.32	1.97	0.6	11,327	11,452	0.55	11,791	0.50
Initao	0.57	0.99	0.2	23,340	23,410	0.15	23,534	0.10
Jasaan	2.23	3.25	2.88	33,598	35,525	2.83	41,842	2.78
Kinoguitan	2.02	2.99	3.42	10,406	11,119	3.37	13,514	3.32
Lagonlong	-0.66	2.02	3.73	15,258	16,401	3.68	20,295	3.63
Laguindingan	2.54	3.48	1.28	16,521	16,929	1.23	18,150	1.18
Libertad	0.89	1.50	1.75	9,258	9,575	1.70	10,555	1.65
Lugait	1.05	1.58	1.68	13,012	13,439	1.63	14,753	1.58
Magsaysay	-0.32	2.02	1.43	23,730	24,389	1.38	26,380	1.33
Manticao	2.17	3.11	1.08	22,630	23,098	1.03	24,471	0.98
Medina	0.92	1.46	1.36	23,319	23,933	1.31	25,781	1.26
Naawan	0.89	1.43	1.78	14,578	15,086	1.73	16,659	1.68
Opol	2.40	3.35	3.19	23,958	25,485	3.14	30,563	3.09
Salay	0.09	0.19	0.89	18,923	19,242	0.84	20,157	0.79
Sugbongco-	-0.11	2.02	2.41	6,957	7,289	2.36	8,352	2.31
Tagoloan	4.41	5.16	3.83	40,929	44,079	3.78	54,861	3.73
Talisayan	0.83	1.32	3.02	19,742	20,931	2.97	24,855	2.92
Villanueva	3.71	4.53	4.47	21,310	23,234	4.42	30,003	4.37
<b>Province</b>	<b>1.28</b>	<b>2.02</b>	<b>2.26</b>	<b>587,551</b>	<b>614,408</b>	<b>2.26</b>	<b>702,57</b>	<b>2.26</b>

Note: 1995 population is census results.

**Table 8.3.3 Municipal Population Projection for the Year 2010**

Municipality	Pop. Projection Using Calculated G.R based on Projected Year 2002 Pop. in Land Use Plan			Pop. Projection/ Growth Rate	
	2003 Pop.	<sup>1)</sup> G.R.	2010 Pop.	<sup>2)</sup> Adjusted	<sup>3)</sup> G.R.
Alubijid	25,685	3.36	32,629	32,165	3.27
Balingasag	53,882	1.39	59,787	58,938	1.29
Balingoan	9,090	0.50	9,487	9,352	0.41
Binaungan	5,816	1.84	6,657	6,562	1.74
Claveria	55,572	1.14	60,643	59,781	1.05
El Salvador	40,686	3.68	52,787	52,036	3.58
Gingoog City	95,328	0.61	100,215	98,791	0.51
Gitagum	11,791	1.97	13,619	13,426	1.87

**Table 8.3.3 Municipal Population Projection for the Year 2010 (contd)**

Municipality	Pop. Projection Using Calculated G.R based on Projected Year 2002 Pop. in Land Use Plan			Pop. Projection/ Growth Rate	
	2003 Pop.	<sup>1)</sup> G.R.	2010 Pop.	<sup>2)</sup> Adjusted	<sup>3)</sup> G.R.
Initao	23,534	0.99	25,407	25,046	0.89
Jasaan	41,842	3.25	52,761	52,011	3.16
Kinoguitan	13,514	2.99	16,733	16,496	2.89
Lagonlong	20,295	2.23	23,866	23,527	2.13
Laguindingan	18,150	3.48	23,236	22,905	3.38
Libertad	10,555	1.50	11,801	11,633	1.40
Lugait	14,753	1.58	16,595	16,359	1.49
Magsaysay	26,380	2.23	31,023	30,582	2.13
Manticao	24,471	3.11	30,554	30,120	3.01
Medina	25,781	1.46	28,753	28,344	1.36
Naawan	16,659	1.43	18,545	18,281	1.34
Opol	30,563	3.35	38,792	38,241	3.25
Salay	20,157	0.19	20,583	20,290	0.09
Sugbongcogon	8,352	2.23	9,822	9,683	2.13
Tagoloan	54,861	5.16	78,644	77,526	5.06
Talisayan	24,855	1.32	27,453	27,063	1.22
Villanueva	30,003	4.53	41,218	40,632	4.43
<b>Province</b>	<b>702,574</b>	<b>2.23</b>	<b>831,612</b>	<b>819,791</b>	<b>2.23</b>

Note: G.R.: Annual Growth Rate

1) Provincial average growth rate is applied for Lagonlong, Magsaysay and Sugbongcogon.

2) Municipal population (provincial total of 831,612) is proportionally adjusted to meet the fixed provincial total of 819,791.

3) Estimated growth rates using projected population for the year 2010.

#### Population by urban and rural area

In the Land Use Plan, urban/rural population by municipality for the year 2002 is projected with 1990 as base year. The annual growth rate of the urban population for the year 2002 by municipality (linear formula) is estimated referring to the experience from 1980 to 1990 and the future land use plan. In the application of a simple compounded formula (in use of projected population in the Land Use Plan), the provincial average growth rate of urban area is estimated at 6.14 %.

Urban and rural population by municipality was studied considering the 1995 census results and the estimated figures in the Land Use Plan.

#### 1) Past population development

With regard to the urban population of the province to the total population, the provincial averages in 1980, 1990 and 1995 were 21 %, 49 % and 36 %, respectively. These fluctuated percentages are caused by the classification of barangays by census year in terms of urban and rural barangays. Likewise, the historical shares of the rural population changed without an order from 79% to 51% (1980-1990) and 64% in 1995.

2) Projection of urban and rural population for the years of 1997, 2003 and 2010

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

In the projection of municipal urban population, the census results in 1995 (provincial average 36%) are applied in terms of the share of urban population to the total population for both short/medium-term and long-term purposes. Under this assumption, the provincial average share of the urban population for the target years was arrived at 36 - 38 %. Table 8.3.4 presents the projected urban and rural population for the years of 1997, 2003 and 2010.

### 8.3.2 School Enrollment Projection

From the 1995 total population of the province, the number of children who would be enrolling in elementary and high school levels for all municipalities is derived.

School age population is extrapolated from the NSO age group classification of 5-9, 10-14 and 15-19 years old bracket by municipality. The age group for the elementary level is from 6 to 13 years, while that for the high school level is from 14 to 17 years. The percentages of school age population for the target years are based on the existing composition or structure of the 1995 population.

From the school age population, the number of children who would attend either private or public school, by target year is computed using the projected participation rate. The participation rate by target year varies depending on the socio-economic condition of the province. Generally, an improved economy will result to a higher participation rate. For the province, a decrease in the participation rate in both private and public schools is foreseen by year 2010.

The number of public school students by target year is then derived from the projected number of children who will attend school. A participation rate for public school enrollment is established based on the existing participation rate of public school students to the total school age population. Based on the projection, a decrease of 6% from the 1997 rate is foreseen in 2003 and a minimal decrease of 1% from the 2003 rate in 2010 (details are referred to Table 8.3.6, Supporting Report). It should be noted that the participation rate in 1997 was over 100%, an indication that a number of school enrollees are over-aged.

Table 8.3.4 Population Projection by Urban and Rural Area

Municipality	1997			2003			2010		
	Total	Urban/ Rural	(%)	Total	Urban/ Rural	(%)	Total	Urban/ Rural	(%)
<b>Urban Area</b>									
Alubijid	22,706	5,714	25.2	25,685	6,463	25.2	32,165	8,094	25.2
Balingasag	47,913	12,799	26.7	53,882	14,394	26.7	58,938	15,744	26.7
Balingoan	7,914	3,628	45.8	9,090	4,167	45.8	9,352	4,287	45.8
Binaungan	5,486	1,533	27.9	5,816	1,625	27.9	6,562	1,834	27.9
Claveria	42,665	19,674	46.1	55,572	25,625	46.1	59,781	27,566	46.1
El Salvador	33,612	6,207	18.5	40,686	7,513	18.5	52,036	9,609	18.5
Gingog City	89,499	32,098	35.9	95,328	34,189	35.9	98,791	35,431	35.9
Gitagum	11,452	2,214	19.3	11,791	2,280	19.3	13,426	2,596	19.3
Initao	23,410	6,112	26.1	23,534	6,145	26.1	25,046	6,539	26.1
Jasaan	35,525	21,071	59.3	41,842	24,818	59.3	52,011	30,850	59.3
Kinoguitan	11,119	1,968	17.7	13,514	2,392	17.7	16,496	2,920	17.7
Lagonlong	16,401	3,459	21.1	20,295	4,280	21.1	23,527	4,962	21.1
Laguindingan	16,929	2,497	14.8	18,150	2,677	14.8	22,905	3,379	14.8
Libertad	9,575	3,554	37.1	10,555	3,917	37.1	11,633	4,318	37.1
Lugait	13,439	6,356	47.3	14,753	6,977	47.3	16,359	7,737	47.3
Magsaysay	24,389	1,546	6.3	26,380	1,672	6.3	30,582	1,938	6.3
Manticao	23,098	6,601	28.6	24,471	6,993	28.6	30,120	8,607	28.6
Medina	23,933	5,820	24.3	25,781	6,270	24.3	28,344	6,893	24.3
Naawan	15,086	3,140	20.8	16,659	3,467	20.8	18,281	3,805	20.8
Opol	25,485	7,205	28.3	30,563	8,640	28.3	38,241	10,811	28.3
Salay	19,242	6,861	35.7	20,157	7,187	35.7	20,290	7,234	35.7
Sugbongcogon	7,289	3,699	50.8	8,352	4,239	50.8	9,683	4,914	50.8
Tagoloan	44,079	44,079	100.0	54,861	54,861	100.0	77,526	77,526	100.0
Talisayan	20,931	4,505	21.5	24,855	5,349	21.5	27,063	5,825	21.5
Villa Nueva	23,234	10,281	44.3	30,003	13,277	44.3	40,632	17,980	44.3
<b>Province</b>	<b>614,408</b>	<b>222,621</b>	<b>36.2</b>	<b>702,574</b>	<b>259,419</b>	<b>36.9</b>	<b>819,791</b>	<b>311,40</b>	<b>38.0</b>
<b>Rural Area</b>									
Alubijid	22,706	16,992	74.8	25,685	19,221	74.8	32,165	24,071	74.8
Balingasag	47,913	35,114	73.3	53,882	39,488	73.3	58,938	43,193	73.3
Balingoan	7,914	4,286	54.2	9,090	4,923	54.2	9,352	5,065	54.2
Binaungan	5,486	3,953	72.1	5,816	4,190	72.1	6,562	4,728	72.1
Claveria	42,665	22,991	53.9	55,572	29,946	53.9	59,781	32,214	53.9
El Salvador	33,612	27,405	81.5	40,686	33,173	81.5	52,036	42,427	81.5
Gingog City	89,499	57,401	64.1	95,328	61,139	64.1	98,791	63,360	64.1
Gitagum	11,452	9,238	80.7	11,791	9,511	80.7	13,426	10,830	80.7
Initao	23,410	17,297	73.9	23,534	17,389	73.9	25,046	18,507	73.9
Jasaan	35,525	14,454	40.7	41,842	17,024	40.7	52,011	21,162	40.7
Kinoguitan	11,119	9,150	82.3	13,514	11,121	82.3	16,496	13,576	82.3
Lagonlong	16,401	12,942	78.9	20,295	16,014	78.9	23,527	18,565	78.9
Laguindingan	16,929	14,432	85.2	18,150	15,473	85.2	22,905	19,527	85.2
Libertad	9,575	6,021	62.9	10,555	6,637	62.9	11,633	7,316	62.9
Lugait	13,439	7,083	52.7	14,753	7,776	52.7	16,359	8,622	52.7
Magsaysay	24,389	22,843	93.7	26,380	24,708	93.7	30,582	28,643	93.7
Manticao	23,098	16,497	71.4	24,471	17,478	71.4	30,120	21,513	71.4
Medina	23,933	18,113	75.7	25,781	19,511	75.7	28,344	21,451	75.7
Naawan	15,086	11,946	79.2	16,659	13,192	79.2	18,281	14,477	79.2
Opol	25,485	18,280	71.7	30,563	21,923	71.7	38,241	27,430	71.7
Salay	19,242	12,381	64.3	20,157	12,970	64.3	20,290	13,056	64.3
Sugbongcogon	7,289	3,589	49.2	8,352	4,113	49.2	9,683	4,768	49.2
Tagoloan	44,079	0	0.0	54,861	0	0.0	77,526	0	0.0
Talisayan	20,931	16,426	78.5	24,855	19,506	78.5	27,063	21,238	78.5
Villa Nueva	23,234	12,953	55.7	30,003	16,726	55.7	40,632	22,652	55.7
<b>Province</b>	<b>614,408</b>	<b>391,788</b>	<b>63.8</b>	<b>702,574</b>	<b>443,155</b>	<b>63.1</b>	<b>819,791</b>	<b>508,39</b>	<b>62.0</b>



Table 8.3.5 shows the projected number of public school students by municipality, by target year. About 177,866,000 and 205,630 public school students are estimated to enroll for years 2003 and 2010, respectively.

**Table 8.3.5 Projected Public School Enrollment and Number of Public Utilities by Municipality**

Municipality/ City	Number of Public School Student			Number of Public Utilities		
	1997	2003	2010	1997	2003	2010
Alubijid	5,901	6,092	7,629	2	5	8
Balingasag	13,874	13,848	15,148	2	5	8
Balingoan	2,129	2,180	2,367	2	5	8
Binuangan	1,769	1,513	1,622	4	7	10
Claveria	12,096	15,212	16,365	4	7	10
El Salvador	6,482	8,615	11,707	2	5	8
Gingog City	22,544	25,830	26,768	6	9	12
Gitagum	2,145	2,398	2,902	2	5	8
Initao	6,755	6,118	6,185	4	7	10
Jasaan	8,879	10,310	12,815	4	7	10
Kinoguitan	2,171	2,861	3,710	1	4	7
Lagonglong	3,859	4,817	5,584		3	6
Laguindingan	4,474	4,597	5,511	1	4	7
Libertad	3,106	2,723	2,851	2	5	8
Lugait	3,882	3,989	4,202	1	4	7
Magsaysay	7,535	7,331	8,051	3	6	9
Manticao	5,203	5,476	6,740	3	6	9
Medina	7,803	6,566	6,839	1	4	7
Naawan	3,624	4,152	4,809	1	4	7
Opol	7,666	7,652	9,575	1	4	7
Salay	5,919	5,373	5,138	1	4	7
Sugbongcogon	2,395	2,379	2,620	1	4	7
Tagoloan	9,977	13,708	19,371	2	5	8
Talisayan	5,528	6,230	6,427	1	4	7
Villanueva	6,029	7,896	10,694	1	4	7
<b>Provincial Total</b>	<b>161,745</b>	<b>177,866</b>	<b>205,630</b>	<b>52</b>	<b>127</b>	<b>202</b>

### 8.3.3 Projection of the Number of Public Utilities

The number of public utilities (limited to public markets and bus/jeepney terminals) by target year is projected in urban areas for all municipalities. The provincial physical framework plan and the provincial comprehensive development plan serve as references in the projection. Bus or jeepney terminals are considered in major transport routes of the province.

A total of 75 public markets, bus/jeepney terminals and parks/playgrounds are planned for construction by year 2003 and another 75 by the year 2010. Refer to Table 8.3.5 for the number of public utilities by municipality by target year (refer to Supporting Report for details).

#### **8.3.4 Planning Area and its Projected Population for Sewerage**

Urban areas with more than 10,000 population provided by Level III water supply systems in 2010 serve as the planning area. Population in the area is considered as the potential population to be served.

Seven (7) municipalities with a total urban population of about 244,000 are considered (refer to Table 8.5.5).

#### **8.3.5 Number of Households to be Served by Municipal Solid Waste Collection System**

The number of urban households in 2003 is the potential households for the planning (refer to Table 8.3.5, Supporting Report).

### **8.4 Types of Facilities and Implementation Criteria**

In principle, types of facilities and their implementation criteria as prescribed in the NSMP and the NEDA Board Resolution No. 12 (s. 1995) are adopted to this PW4SP.

#### **8.4.1 Water Supply**

The following are major conditions and assumptions applied to urban and rural water supply, which are intended as a guide for the implementation of sector projects.

##### **(1) Urban water supply**

Prevailing situation of urban water supply in each municipality was firstly reviewed mainly focusing on existing water sources and magnitude of service coverage. Planned/on-going projects for concerned municipalities were also studied and reflected in the planning, with due attention to merging of municipalities into an integrated water supply system. Potential water source for future development was then evaluated based on the study results in Chapter 7, taking into account the possibility to utilize untapped spring sources. Recommendations arising from these studies were also incorporated as overall development strategy.

Aforementioned studies were carried out by the following sequence:

- Review of existing water supply systems and water sources;
- Review of planned/on-going projects;
- Establishment of planning conditions covering service level, utilization of existing facilities, water sources, and number of systems; and

- Recommendations for overall development strategy.

Table 8.4.1 presents summary of the study results by municipality.

1) Review of existing water supply systems and water sources

Majority of the existing Level III systems in urban areas is utilizing spring sources. The municipalities/city of Claveria, Gingoog and Opol are served by WDs. While the municipalities of Alubijid, Balingoan, El Salvador, Gitagum, Initao, Jasaan, Kinoguitan, Lagonglong, Laguindingan, Libertad, Lugait, Manticao, Naawan, Sugbongcogon, Tagoloan and Villanueva are served by Level III systems operated either by the provincial /municipal government or local community.

Currently, 4 out of the total 25 municipalities/city, namely: Balingasag, Binuangan, Magsaysay, Salay and Talisayan have no Level III system in their urban areas and are presently served by Level II systems and/or Level I facilities.

Population served by Level III systems range from about 1,000 persons in Sugbongcogon to 39,200 persons in Tagoloan. The average size of served population is about 5,000 persons (excluding municipality of Opol served by Cagayan de Oro CWD).

Preference is made to utilize spring sources owing to less O&M activities and cost compared to deep well with electric motor pump.

2) Review of planned/on-going projects

At present, there is no particular planned/on-going project for municipalities/city in the province.

3) Establishment of planning conditions

a. Service level

It shall be noted that a national policy for urban water supply is a Level III system, in general, as the most suitable measure. Therefore, for the investment needs of the sector development, it is assumed in this PW4SP that underserved or unserved urban population at present and in the future will be provided with individual house connections. However, it does not intend to exclude from being implemented Level I and II facilities in urban area as individual cases in the future

Table 8.4.1 Summary of Urban Water Supply by Municipality

Municipality	Existing Condition	Future Requirements	Water Source Availability	On-going/ Planned Project
Atubijid	Only one Level III exists managed by RWSA (served population is 3,000, 53% of urban population) under the supervision by provincial government. Water source (total capacity of 700 cu.m/day) is a combination of spring (RWSA owns) and deep well (Owner is municipal government). Service extension to the hilly area is necessary. For the future development some shortage is projected.	System expansion is required. Augmentation of well source shall be sought.	Deep well (Good potential, but saline water may be encountered)	None
Balingoasag	There is no Level III system. They use Level I free flowing wells in poblacion area, but there is quality problem (odor).	Individual Level III system shall be developed using a spring source located in Brgy. Canuayan, about 5Km from the poblacion.	A spring source was identified. The discharge rate of the spring is 1,000 cu.m/day (15,000 persons shall be served in the year 2010). It is necessary to confirm water right.	None
Balingoan	One Level III system managed by RWSA (converted from Level II) exists at present. The service is extended to about 50% of urban population. The water source is spring with pumped system due to topographical condition. Rehabilitation/ improvement of the pipe systems is a requisite (3" dia pipe). Water source does not have problem both in quality and quantity.	System expansion is required.	Priority shall be given to spring source development.	None
Binuangan	There is no Level III system (urban population is only 1,500). The area is covered either by Level II or Level I. The water source is spring, but pumping system is used.	The upgrading of Level II to Level III or integrated system with neighboring municipalities shall be studied.	Priority shall be given to spring source development.	None
Claveria	There is one WD covering about 7,000 population (36% of urban population). Water source is the spring with sufficient discharge (many good spring sources exist). Expansion shall be provided in use of spring sources.	System expansion is required.	Spring source	None

Table 8.4.1 Summary of Urban Water Supply by Municipality (cont'd.)

Municipality	Existing Condition	Future Requirements	Water Source Availability	On-going/ Planned Project
El Salvador	One Level III system operated by municipal government exists. 5,800 persons (94% of urban population) are served. Water source is deep well. Expansion needs may be minimal through the future.	Minor expansion will be required.	No untapped spring source exists, thus deep wells shall be used.	None
Gingoog City	One Water District exists covering 11,700 (36% of urban population). Water source is deep well (3,800 cu.m/day), which is sufficient enough. Expansion of the system is a requisite.	System expansion	Existing deep well sources have sufficient discharge. Spring sources are also expected as an alternative.	None
Gitagum	One Level III managed by municipality exists. The system covers 2,000 population (92% of urban population is covered). The spring source is used for the supply.	Minor expansion	Deep well (fair potential) may be developed, since there are not so many untapped springs.	None
Initao	One Level III managed by municipal government exists. Served population is 6,100 (100% service coverage of urban population). Water sources are deep wells.	Minor expansion to meet population growth will be required.	Deep well (fair potential) may be used.	None
Jasaan	One Level III managed by RWSA exists. 4,800 persons (about 23% of urban population) are served by the system. Water source is spring (there are many good spring sources).	Expansion of the system is required with augmentation of water sources.	Priority shall be given to spring source.	None
Kinoguitan	One Level III exists operated by the municipality. The system serves 1,300 persons (65% of urban population). Water source is deep well (80 cu.m/day). Scheduled water supply is practiced due to insufficient water source and inadequate facility capacity (1970s constructed).	Augmentation and expansion of the system are required. As an alternative, integrated water supply (spring water use) with neighboring municipalities shall be studied.	Spring source	None
Lagolong	One Level III is operated by the municipality. Service population is 1,500 (44% of the urban population) Water source is spring in application of pumping system. There are many spring sources.	Expansion of the system will be required using spring source (2-5 km from the service area).	Spring source	None

Table 8.4.1 Summary of Urban Water Supply by Municipality (cont'd.)

Municipality	Existing Condition	Future Requirements	Water Source Availability	On-going/Planned Project
Laguindingan	International air port project is under way. There are two Level III systems; one RWSA and the other municipal government). Service population is 2,500 (100% of urban population). Deep well (municipal government) and spring (RWSA) are utilized. Scheduled water supply is practiced (4 hours a day). The limited capacity of facilities and insufficiency of water source are major reasons of the problem.	Rehabilitation/augmentation of the system is required.	Deep well (fair potential) shall be developed, since spring source is poor.	None
Libertad	One Level III managed by RWSA exists. The system serves for 1,800 (50% of urban population). Water source is deep well (50cu.m/day). Scheduled water supply is practiced (4 hours a day).	Augmentation of water source using deep wells shall be studied.	Deep well (fair potential) shall be developed, since spring source is poor.	None
Lugait	One Level III operated by municipal government exists. 6,200 persons (100% of urban population) are served by the system. Water sources are combined ones (spring and deep well).	Rehabilitation of piping system is required.	Deep well may be developed (fair potential), but affect of saline water intrusion shall be studied. Spring source is poor.	None
Magsaysay	There is no Level III. Deep well source is salty. They are served by Level I and II systems.	Individual Level III system shall be developed. Investigations on deep wells shall be conducted and appropriate measures shall be provided.	Deep well source has good potential, but saline water problem may be encountered.	None
Manticao	One Level III supervised by provincial government exists. Service population is 3,700 (55% of urban population). Water source is spring (1,300 cu./day). Inappropriate pipe arrangements caused problems.	The review of the piping system is required and countermeasures shall be provided thereafter. Expansion of the system is also necessary using spring sources.	Spring source	None
Medina	One Level III exists operated by RWSA. 5,700 persons are served by the system (100% of urban population). Main source is spring supplemented by deep well.	Minor expansion	Both deep well/spring sources are available. However, priority shall be given to spring development.	None
Naawan	One Level II exists operated by municipal government. 1,800 persons are served by the system (56% of urban population). Water source is deep well (capacity is 860 cu.m/day).	Expansion is required using deep wells. Chlorination practices shall be properly done.	Deep well may be developed (partly good potential), but influence of saline water intrusion shall be studied.	None

Table 8.4.1 Summary of Urban Water Supply by Municipality (cont'd.)

Municipality	Existing Condition	Future Requirements	Water Source Availability	On-going/ Planned Project
Opol	7% of urban population is covered by Cagayan de Oro City WD. The WD has a plan to extend the services to the municipality. However, the plan is not yet realized due to financial problem. Other people rely on Level I or Level II systems.	Expansion / construction of Level III either by the WD or the municipality shall be implemented. Water source to be used is deep wells/river bed water.	Under preparation of expansion plan by Cagayan de Oro CWD (wells with a depth of 50-70m along Cagayan River)	None
Salay	There is one Level III system operated by RWSA. Water source is spring.	Expansion is required using spring source. The study on upgrading Level III shall be conducted.	Untapped spring sources shall be developed.	None
Sugbongcogon	One Level III exists managed by municipal government. Served population is 1,000 (26% of urban population). Water source is spring (140 cu.m/day).	Expansion of the system entailing augmentation of pipe line capacity. Integrated water supply shall be sought with neighboring municipalities.	Spring source	None
Tagoloan	One Level III operated by municipal government exists. 39,000 persons (89% of urban population is covered) are served by the system. Water source is spring.	System expansion with augmentation of water source	Priority shall be given to spring, while deep well source (good potential) is an alternative.	None
Talisayan	No Level III exists at present. Majority of urban population is served by Level II. Water source is spring (discharge rate is limited).	Individual Level III system shall be also developed. Upgrading of Level II shall also be studied using deep well sources.	Deep well (fair potential) may be used for water source augmentation.	None
Villanueva	There are two Level III systems, one municipal and the other RWSA managed. 7,200 persons are served by these systems (70% of urban population). Water sources are springs both for the two systems. Discharge rates are sufficient for the WWs.	System expansion using spring sources is required. Distribution network shall be improved/ replaced.	Spring source	None

b. Utilization of existing facilities

The existing Level I and II facilities are considered to be utilized during the Phase I period. However, the population served by these facilities is assumed to be absorbed by Level III service in Phase II.

c. Water sources

Possibility/availability to utilize surface water and groundwater (spring and deep well) is evaluated as potential water sources for water supply development.

From the viewpoints of cost effectiveness and easy O&M of water supply system, utilization of spring sources is given due priority in the course of urban water supply planning. Application of deep wells for water source is regarded as the second priority in principle. Surface water is, on the other hand, not adopted at this moment, because of large capital investment requirements and complexity of surface water treatment.

Water source development study revealed that some of the municipalities in the planning area have high potential for spring development. Among various untapped spring sources identified during the course of PW4SP preparation, the untapped sources located in the municipalities of Balingasag and Tagoloan are considered to have favorable conditions for use in Level III services.

d. Number of systems

In principle, one (1) Level III system is considered for urban area of every municipality. In the municipalities with an existing Level III system/s, the expansion of the system was first considered. In case of no existence of Level III system/s, a new system was recommended. Existing plan/s on the development of Level III/WD are also taken into account to determine respective systems of the municipalities.

- Possibility and necessity to merge service area of some neighboring municipalities to an urban water supply system were also studied from the view points of:
  - water source constraints, and
  - economical development/scale merit of water supply system by cost reduction of water source development and other common facilities as well as O&M cost/minimized number of technical staff.



Any rural barangay/s being served by an existing urban Level III system are considered to continue throughout the future.

c. Rehabilitation

Rehabilitation of existing and future facilities is assumed to be undertaken by the operating bodies.

4) Overall development strategy

Expansion of the existing system/s was planned for those with WD/Level III, while creation of the system is considered for those without systems at present.

Merging of municipal systems (physical arrangement) in long-term is considered. Integrated management systems shall also be sought. Conditions to be studied include: water source availability, willingness by concerned municipalities and technical study on cost recovery/economic construction.

The following municipalities may be studied for the integration both in physical and management systems.

- Kinoguitan, Sugbongcogon and Binuangan (using spring either in Kinoguitan or Sugbongcogon in application of gravity system)

Integration of small Level III systems for operation and management shall be sought, although these systems are currently managed individually.

Some municipalities have high potential in spring development as a result of a number of untapped spring sources favorable for urban water supply were identified during the course of PW4SP preparation. However, detailed survey to ensure appropriate developments of spring sources shall be conducted in the implementation of the projects.

(2) Rural water supply

1) Service level

Level I systems (deep and shallow wells) are generally planned for rural areas where houses are scattered. In the PW4SP, public investment for Level I facilities covers 90% of the total number of required facilities, considering the existing share of population served between public (89%) and private facilities (11%).

Level II systems are considered where houses are clustered and suitable untapped spring is available.

Service level standards are set forth as 15 households per source for Level I and 5 households per communal faucet for Level II, as defined in the national plan.

Application of Level III systems in rural areas may be considered in a case to case basis during actual implementation.

2) Utilization of existing facilities

The existing facilities/systems in all service levels are considered to be utilized throughout the future.

3) Water source

For Level I facilities, deep well construction is given priority wherever applicable considering safety against possible contamination and stable water supply. Standard specifications of shallow and deep wells are summarized in Table 8.4.2 based on the water source evaluation results presented in Chapter 7. Conventional construction method (driven well) may be employed under favorable substrata or hydrogeological conditions. The standard structure of wells in application of "open-hole drilling and gravel pack" is presented in Figure 8.4.1, Supporting Report. In addition to this, for deep well with high iron content, application of iron removal facility is recommended. The standard structure of iron removal facility is presented in Figure 8.4.2, Supporting Report.

Spring development is also included in Level I planning adopting its share of 20%. This takes into account the existing percentage of developed springs (21%) among public Level I facilities as safe water sources.

**Table 8.4.2 Standard Specifications of Level I Wells**

Specification	Shallow Well	Deep Well
Construction Method	Open-hole drilling and gravel pack	
Casing Diameter	50mm	100mm
Borehole Diameter	150mm	200mm
Ranges of Well Depth	Standard Depth	
0 - 20m	20m	Not Applicable
21 - 50m	Not Applicable	40m
51 - 100m	Not Applicable	80m
101 - 150m	Not Applicable	120m

Profile between gravel packed well and natural gravel packed well for Level I water supply:

The open-hole drilling method is employed for the well construction to ensure yielding ground water from adequate aquifer in provision of proper screen location and specifications. The conventional "cased-hole driven well" shall be used only in cases where well specifications are established in the specified area with sufficient information on the hydrogeological condition including existence of natural gravel at the expected aquifer.

It is important to study on the potential area to adopt natural gravel method, which can perform the same level of function as gravel-packed wells. Such areas are usually limited to the upper stream of larger rivers in alluvial fans and alluvial plains. The arial proportion between those in application of gravel-packed and natural gravel pack wells will be worked out referring to the condition of the province.

Modification needs of riser pipe diameter according to the water level of deep wells:

The standard specification of deep well hand pump is set with a diameter of 2-1/2 inch in the plan. However, water level of the deep wells may range between 20 m and around 40 m, depending on the aquifer conditions.

Although, Malawi type deep well pump with a cylinder, currently used in the Philippines, has operation experience up to 40 m in pumping water level, the diameter of riser pipe shall be adjusted between 1" to 2-1/2" to mitigate required power at the pump handle (calculating required power under the specific pumping water level).

For Level II systems, only untapped springs suitable for water supply purpose are considered. Identified untapped springs are presented in Table 7.4.1, Supporting Report.

4) Number of systems/facilities

The number of Level I wells and spring development is estimated based on the service level standard; while the number of Level II systems coincides with the number of untapped springs.

#### 5) Rehabilitation

Rehabilitation of existing Level I wells is not considered, since most of the existing wells constructed by driving method is not suitable for rehabilitation to recover their functions. However, minor repair work for handpump and concrete apron is a requisite.

### 8.4.2 Sanitation

The conditions and assumptions are established for the different sanitation components to serve as guides in the implementation of projects.

#### (1) Household toilets

Three types of sanitary toilet facilities for individual houses are considered for Phase I; flush, pour-flush and VIP/sanitary pit privy (dry-type). While for Phase II, flush and pour-flush are planned considering the improvement of living standard.

The type of toilet facilities is dependent on the existing or planned service level of water supply in the community. In urban and rural areas with Level I or II water supply facilities, only pour-flush and/or VIP are considered, while in urban areas with Level III water supply systems, flush type toilets requiring a piped water connection are included. Isolated rural areas where there is dearth of water supply, sanitary pit privy (dry type) is considered.

#### (2) School toilets

Standard service level currently used by DECS (40 students per unit facility) is employed for both phases.

The standard toilet facility (1 building) with 5 units of toilet bowl to serve for 200 students is adopted for the planning purpose, which is modified from FW4SP design to provide a shallow well as a water source.

#### (3) Public toilets

As a minimum requirement, at least 1 sanitary toilet facility is assumed to be provided for respective utilities: public market and bus/jeepney terminal.

The FW4SP standard design with 6-units of toilet bowl for the market is adopted. In this design, it is assumed that water supply will be tapped from the existing system, hence an elevated water tank is provided.

### **8.4.3 Urban Sewerage**

The commencement of staged implementation of the sewerage program is planned in Phase II for the limited urban area (50% of urban population served by Level III system for the municipalities with urban population of more than 10,000). It is practical to start the program fully using the existing facilities to allow for lower initial investment cost than starting at once a conventional sewerage system (refer to Figure 8.4.2 Staged Improvement in Sewage Collection Method, Supporting Report).

Low cost off-site technologies such as small-bore sewer for collection of effluent from septic tank are to be adopted. Improvement of sewage collection method may be gradually achieved from combined sewer to separate sewerage system.

Sewage treatment facilities may range from community scale septic tank or Imhoff tank to aerated lagoon systems and to a more advanced treatment process such as oxidation ditch. For this PW4SP, aerated lagoons are assumed as a representative treatment facility for planning purpose. Daily average wastewater quantity is assumed to be 100L per capita per day.

### **8.4.4 Solid Waste**

In terms of facility requirements, this PW4SP only studied the number of refuse collection trucks required for the year 2003. A rated capacity of 5 cu.m truck/vehicle is considered for calculation of required units of truck. Disposal of solid waste shall be studied in detail through investigations, F/S and D/D. Unit solid waste generation for urban area is assumed to be 0.418 kg. per capita per day.

## **8.5 Service Coverage by Target Year**

### **8.5.1 Water Supply**

The service coverage in terms of population to be served by target year was estimated by urban and rural area by municipality. The service coverage in rural area was further subdivided by service level (Level I & Level II) to finally come up with physical requirements.

Base figures applied to estimate the future service coverage and the additional population to be served are:

- provincial sector targets,
- population projection by target year, and
- base year service coverage (served population) by existing facilities.

Future requirements in terms of additional population to be served were then estimated by urban (Level III) and rural (Level I & II) area by municipality as a shortfall to meet the population to be served in each target year. The population served in base year is adopted as the population served in target year, when the former population exceeds the population to be served in the target year/s. Manner of calculation is specifically presented by phase.

(1) Phase I requirements

Additional service coverage was estimated as a shortfall of the population to be served in Phase I comparing with the population served in base year. In this connection, existing facilities both in urban and rural areas are assumed to be utilized during the Phase I period.

The utilization of untapped springs for Level II systems was given priority during Phase I period for rural water supply. At the time of this plan preparation, 14 untapped springs in 6 municipalities were identified.

(2) Phase II requirements

Additional service coverage was estimated as a shortfall of the population to be served in Phase II comparing with the population served in Phase I. In this regard, existing facilities in rural area were assumed to be utilized through the two Phases, while urban population served by Level I and II facilities in base year was assumed to be absorbed by Level III service during Phase II period.

Table 8.5.1 presents the service coverage by target year and by level of service as well as the additional population to be served (details are referred to Supporting Report).

Through Phase I development, approximately 91,700 persons in the province will be served by additional water supply services, of which 34,200 persons or 37% of the total will be urban population and 57,500 persons or 63% will be rural population.

For Phase II period, a total of 282,300 persons, of which 147,200 persons or 52% in urban area and 135,100 persons or 48% in rural area, will be further benefited by water supply

Table 8.5.1 Population to be Served by Target Year (Water Supply)

Name of Municipality	Area	Phase I Coverage (2003)										Phase II Coverage (2010)																			
		Total Population					Service Coverage					Additional Population to be Served					Total Population					Service Coverage					Additional Population to be Served				
		Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total		
Alubijid	Urban	6,463	3,757	200	1,666	5,623	707	1,505	1,505	707	8,094	7,689	3,932	7,689	3,932	3,932	7,689	3,932	3,932	7,689	3,932	3,932	7,689	3,932	3,932	7,689	3,932	3,932	7,689	3,932	
	Rural	19,222	3,568	3,568	10,849	14,417	1,505	1,505	2,212	1,505	24,071	22,386	18,818	18,818	18,818	18,818	22,386	18,818	18,818	22,386	18,818	18,818	22,386	18,818	18,818	22,386	18,818	18,818	22,386	18,818	
	Total	25,685	7,325	3,768	12,515	20,040	707	4,085	4,085	4,085	32,165	30,075	3,932	3,932	3,932	3,932	30,075	3,932	3,932	30,075	3,932	3,932	30,075	3,932	3,932	30,075	3,932	3,932	30,075	3,932	
Balingasag	Urban	14,394	4,085	3,575	8,438	12,523	2,700	7,598	10,298	43,194	43,194	36,595	36,595	36,595	36,595	40,170	36,595	36,595	40,170	36,595	36,595	40,170	36,595	36,595	40,170	36,595	36,595	40,170	36,595		
	Rural	39,488	4,085	3,575	26,041	29,616	2,700	7,598	10,298	14,383	58,538	58,538	40,728	40,728	40,728	40,728	40,728	40,728	40,728	40,728	40,728	40,728	40,728	40,728	40,728	40,728	40,728	40,728	40,728		
	Total	53,882	8,170	7,150	34,479	42,139	5,400	15,896	20,596	57,577	102,772	102,772	77,456	77,456	77,456	80,900	77,456	77,456	80,900	77,456	77,456	80,900	77,456	77,456	80,900	77,456	77,456	80,900	77,456		
Balingoan	Urban	4,167	2,179	210	1,236	3,625	459	1,177	1,177	5,346	5,346	4,887	4,887	4,887	4,887	4,887	4,887	4,887	4,887	4,887	4,887	4,887	4,887	4,887	4,887	4,887	4,887	4,887	4,887		
	Rural	4,923	2,179	610	3,292	3,692	459	1,177	1,177	9,339	9,339	8,711	8,711	8,711	8,711	8,711	8,711	8,711	8,711	8,711	8,711	8,711	8,711	8,711	8,711	8,711	8,711	8,711	8,711		
	Total	9,090	4,358	820	4,528	7,317	918	2,354	2,354	14,685	14,685	13,598	13,598	13,598	13,598	13,598	13,598	13,598	13,598	13,598	13,598	13,598	13,598	13,598	13,598	13,598	13,598	13,598	13,598		
Binuangan	Urban	1,626	246	715	454	1,415	246	478	478	3,134	3,134	2,656	2,656	2,656	2,656	2,656	2,656	2,656	2,656	2,656	2,656	2,656	2,656	2,656	2,656	2,656	2,656	2,656	2,656		
	Rural	4,190	246	2,535	983	3,518	246	715	715	7,654	7,654	6,869	6,869	6,869	6,869	6,869	6,869	6,869	6,869	6,869	6,869	6,869	6,869	6,869	6,869	6,869	6,869	6,869	6,869		
	Total	5,816	492	3,250	1,437	4,933	492	1,193	1,193	10,808	10,808	9,525	9,525	9,525	9,525	9,525	9,525	9,525	9,525	9,525	9,525	9,525	9,525	9,525	9,525	9,525	9,525	9,525	9,525		
Claveria	Urban	25,625	13,631	300	8,363	22,294	6,531	1,433	1,433	32,215	32,215	21,027	21,027	21,027	21,027	21,027	21,027	21,027	21,027	21,027	21,027	21,027	21,027	21,027	21,027	21,027	21,027	21,027	21,027		
	Rural	29,947	21,027	300	1,433	22,460	6,531	1,433	1,433	59,781	59,781	47,215	47,215	47,215	47,215	47,215	47,215	47,215	47,215	47,215	47,215	47,215	47,215	47,215	47,215	47,215	47,215	47,215	47,215		
	Total	55,572	34,658	600	9,796	44,754	13,062	2,866	2,866	92,496	92,496	74,442	74,442	74,442	74,442	74,442	74,442	74,442	74,442	74,442	74,442	74,442	74,442	74,442	74,442	74,442	74,442	74,442	74,442		
El Salvador	Urban	7,513	6,536	300	2,171	47,638	3,964	3,964	3,964	9,609	9,609	9,129	9,129	9,129	9,129	9,129	9,129	9,129	9,129	9,129	9,129	9,129	9,129	9,129	9,129	9,129	9,129	9,129	9,129		
	Rural	33,173	1,100	3,340	20,440	24,880	719	3,778	3,778	42,427	42,427	39,457	39,457	39,457	39,457	39,457	39,457	39,457	39,457	39,457	39,457	39,457	39,457	39,457	39,457	39,457	39,457	39,457	39,457		
	Total	40,686	7,636	3,640	20,440	31,416	719	7,752	7,752	51,856	51,856	48,886	48,886	48,886	48,886	48,886	48,886	48,886	48,886	48,886	48,886	48,886	48,886	48,886	48,886	48,886	48,886	48,886	48,886		
Gingoog City	Urban	34,189	15,674	2,766	11,304	29,744	3,964	3,964	3,964	63,360	63,360	43,665	43,665	43,665	43,665	43,665	43,665	43,665	43,665	43,665	43,665	43,665	43,665	43,665	43,665	43,665	43,665	43,665			
	Rural	61,139	4,365	41,102	2,171	47,638	3,964	3,964	3,964	98,791	98,791	88,024	88,024	88,024	88,024	88,024	88,024	88,024	88,024	88,024	88,024	88,024	88,024	88,024	88,024	88,024	88,024	88,024	88,024		
	Total	95,328	20,039	43,868	13,475	77,382	7,928	7,928	7,928	162,151	162,151	131,689	131,689	131,689	131,689	131,689	131,689	131,689	131,689	131,689	131,689	131,689	131,689	131,689	131,689	131,689	131,689	131,689	131,689		
Gtagum	Urban	2,280	2,040	304	4,099	7,133	484	484	484	10,830	10,830	10,072	10,072	10,072	10,072	10,072	10,072	10,072	10,072	10,072	10,072	10,072	10,072	10,072	10,072	10,072	10,072	10,072			
	Rural	9,511	2,040	3,034	4,099	9,173	484	484	484	13,426	13,426	12,538	12,538	12,538	12,538	12,538	12,538	12,538	12,538	12,538	12,538	12,538	12,538	12,538	12,538	12,538	12,538	12,538			
	Total	11,791	4,080	6,068	8,198	16,306	968	968	968	24,256	24,256	22,610	22,610	22,610	22,610	22,610	22,610	22,610	22,610	22,610	22,610	22,610	22,610	22,610	22,610	22,610	22,610	22,610			
Intiao	Urban	6,145	6,094	1,838	11,204	13,042	1,176	1,176	1,176	18,507	18,507	17,212	17,212	17,212	17,212	17,212	17,212	17,212	17,212	17,212	17,212	17,212	17,212	17,212	17,212	17,212	17,212	17,212			
	Rural	17,389	6,094	1,838	11,209	19,141	1,176	1,176	1,176	25,046	25,046	23,424	23,424	23,424	23,424	23,424	23,424	23,424	23,424	23,424	23,424	23,424	23,424	23,424	23,424	23,424	23,424	23,424			
	Total	23,534	12,188	3,676	22,413	32,183	2,352	2,352	2,352	43,553	43,553	40,636	40,636	40,636	40,636	40,636	40,636	40,636	40,636	40,636	40,636	40,636	40,636	40,636	40,636	40,636	40,636	40,636			
Jasaan	Urban	24,818	7,155	2,988	11,449	21,592	2,370	2,370	2,370	30,849	30,849	29,307	29,307	29,307	29,307	29,307	29,307	29,307	29,307	29,307	29,307	29,307	29,307	29,307	29,307	29,307	29,307	29,307			
	Rural	17,024	7,840	1,144	3,784	12,768	530	530	530	21,162	21,162	19,681	19,681	19,681	19,681	19,681	19,681	19,681	19,681	19,681	19,681	19,681	19,681	19,681	19,681	19,681	19,681				
	Total	41,842	14,995	4,132	15,233	34,360	2,370	2,370	2,370	52,011	52,011	49,308	49,308	49,308	49,308	49,308	49,308	49,308	49,308	49,308	49,308	49,308	49,308	49,308	49,308	49,308					
Kinoguitan	Urban	2,392	1,399	678	4	2,081	119	119	119	2,920	2,920	2,774	2,774	2,774	2,774	2,774	2,774	2,774	2,774	2,774	2,774	2,774	2,774	2,774	2,774	2,774	2,774				
	Rural	11,122	3,456	4,886	8,342	8,342	737	737	737	13,576	13,576	12,626	12,626	12,626	12,626	12,626	12,626	12,626	12,626	12,626	12,626	12,626	12,626	12,626	12,626	12,626	12,626				
	Total	13,514	4,855	5,564	12,384	16,724	856	856	856	17,152	17,152	15,402	15,402	15,402	15,402	15,402	15,402	15,402	15,402	15,402	15,402	15,402	15,402	15,402	15,402						
Lagonglong	Urban	4,280	2,789	1,800	935	3,724	1,269	1,269	1,269	6,054	6,054	5,785	5,785	5,785	5,785	5,785	5,785	5,785	5,785	5,785	5,785	5,785	5,785	5,785	5,785	5,785					
	Rural	16,015	1,800	1,800	8,411	12,011	2,733	2,733	2,733	18,565	18,565	17,265	17,265	17,265	17,265	17,265	17,265	17,265	17,265	17,265	17,265	17,265	17,265	17,265	17,265						
	Total	20,295	4,589	3,600	9,346	15,735	4,002	4,002	4,002	25,620	25,620	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050	23,050							
Laguindingan	Urban	2,677																													

Table 8.5.1 Population to be Served by Target Year (Water Supply) (Cont'd.)

Name of Municipality	Area	Phase I Coverage (2003)						Phase II Coverage (2010)												
		Total Population			Additional Population to be Served			Total Population			Service Coverage			Additional Population to be Served						
		Level III	Level II	Level I	Level III	Level II	Level I	Total	Level III	Level II	Level I	Level III	Level II	Level I	Level III	Level II	Level I	Total		
Libertad	Urban	3,917	2,179	690	539	3,408	399	4,317	4,101	1,866	4,938	4,101	1,866	4,938	4,101	1,866	4,938	4,101	1,825	1,825
	Rural	6,638	3,113	1,866	3,113	4,979	2,569	7,316	6,804	1,866	4,938	6,804	1,866	4,938	6,804	1,866	4,938	6,804	1,825	1,825
	Total	10,555	2,179	2,556	3,652	8,387	399	2,968	11,633	4,101	1,866	4,938	10,905	1,866	4,938	10,905	1,866	4,938	1,825	1,825
Lugait	Urban	6,977	6,172	100	6,272			7,737	7,350	4,685	2,577	8,018	4,685	2,577	8,018	4,685	2,577	8,018	1,965	1,965
	Rural	7,776	756	4,685	612	6,053		8,622	756	4,685	2,577	15,368	4,685	2,577	15,368	4,685	2,577	15,368	1,965	1,965
	Total	14,753	6,928	4,785	612	12,325		16,359	8,106	4,685	2,577	31,736	4,685	2,577	31,736	4,685	2,577	31,736	3,930	3,930
Magsaysay	Urban	1,672	61	1,353	41	1,455	61	1,938	1,841			26,639			1,841			1,780	8,108	8,108
	Rural	24,708		18,531		18,531		28,644	8,170	8,170		26,639			8,170			1,780	8,108	8,108
	Total	26,380	61	1,353	18,572	19,986	61	30,582	36,814	16,340	16,340	55,283	16,340	16,340	35,014	16,340	16,340	35,014	16,340	16,340
Manticao	Urban	6,993	4,239		1,845	6,084	579	8,607	8,177	619	19,388	20,007	619	19,388	20,007	619	19,388	20,007	6,898	6,898
	Rural	17,478	619	12,490	13,109		499	21,513	1,810	1,810		30,120	8,177	619	19,388	28,184	3,938	3,938	6,898	6,898
	Total	24,471	4,239	619	14,335	19,193	579	28,888	30,120	3,620	3,620	60,240	9,987	2,429	22,376	32,168	7,876	7,876	13,796	13,796
Medina	Urban	6,270	5,650		5,650			6,893	6,548	7,407	12,082	19,949	7,407	12,082	19,949	7,407	12,082	19,949	5,316	5,316
	Rural	19,511	460	7,407	6,766	14,633	764	21,451	460	460		26,497	898		26,497	898		26,497	5,316	5,316
	Total	25,781	6,110	7,407	6,766	20,283	764	28,344	7,008	7,008		53,196	1,396	1,396	53,196	1,396	1,396	53,196	10,632	10,632
Naawan	Urban	3,467	2,254		762	3,016	494	3,805	3,615	708	12,755	13,463	708	12,755	13,463	708	12,755	13,463	3,569	3,569
	Rural	13,192	708	9,186	8,984		2,614	14,476	2,614	2,614		18,281	3,615	708	12,755	17,078	1,361	1,361	3,569	3,569
	Total	16,659	2,254	708	9,948	12,910	494	18,281	3,108	3,108		32,762	7,234	708	12,755	30,156	1,676	1,676	7,138	7,138
Opol	Urban	8,640	5,117	450	1,950	7,517	4,607	10,811	10,270	7,938	27,430	27,430	7,938	27,430	27,430	7,938	27,430	27,430	9,068	9,068
	Rural	21,923		16,442		16,442		38,241	10,270	10,270		38,241	10,270	10,270	38,241	10,270	10,270	38,241	9,068	9,068
	Total	30,563	5,117	450	18,392	23,959	4,607	49,052	20,541	20,541		76,682	20,541	20,541	76,682	20,541	20,541	76,682	18,136	18,136
Salay	Urban	7,187		6,747	86	6,833		905	905	905	13,056	13,056	905	13,056	13,056	905	13,056	13,056	2,414	2,414
	Rural	12,970		2,077	7,651	9,728		20,290	6,872	6,872	20,290	20,290	6,872	20,290	20,290	6,872	20,290	20,290	2,414	2,414
	Total	20,157		8,824	7,737	16,561		29,345	13,727	13,727	33,346	33,346	13,727	33,346	33,346	13,727	33,346	33,346	4,828	4,828
Sugbongcogon	Urban	4,239	970	2,730		3,700		4,915	4,669	2,086	1,826	4,434	2,086	1,826	4,434	2,086	1,826	4,434	874	874
	Rural	4,113	522	2,086	952	3,560		9,683	5,191	2,086	1,826	9,103	2,086	1,826	9,103	2,086	1,826	9,103	874	874
	Total	8,352	1,492	4,816	952	7,260		14,698	9,856	4,177	3,652	13,537	4,172	3,652	13,537	4,172	3,652	13,537	1,748	1,748
Tagoloan	Urban	54,861	42,880	4,849		47,729	3,650	71,526	73,650			73,650			73,650			73,650	30,770	30,770
	Rural																			
	Total	54,861	42,880	4,849		47,729	3,650	71,526	73,650			73,650			73,650			73,650	30,770	30,770
Talisayan	Urban	5,349	973	3,250	431	4,684	973	5,825	5,534	4,224	21,238	21,238	4,224	21,238	21,238	4,224	21,238	21,238	5,121	5,121
	Rural	19,506		2,230	14,400	14,630		27,063	5,534	5,534		25,285	4,561	4,561	25,285	4,561	4,561	25,285	5,121	5,121
	Total	24,855	973	5,480	14,830	29,260		52,301	11,068	9,768	46,823	46,823	9,768	46,823	46,823	9,768	46,823	46,823	10,242	10,242
Villanueva	Urban	13,277	10,099	100	8,452	12,545	2,945	11,551	2,945	5,295	22,652	22,652	5,295	22,652	22,652	5,295	22,652	22,652	8,521	8,521
	Rural	16,726	3,993	100	9,904	24,096	2,945	34,177	34,177	34,177	34,177	34,177	34,177	34,177	34,177	34,177	34,177	34,177	8,521	8,521
	Total	30,003	14,092	200	18,349	46,641	5,890	45,728	45,728	45,728	45,728	45,728	45,728	45,728	45,728	45,728	45,728	45,728	17,042	17,042
Provincial Total	Urban	259,418	148,676	28,026	50,960	227,662	34,177	341,777	295,828	341,777	311,398	295,828	341,777	295,828	311,398	295,828	341,777	295,828	147,152	147,152
	Rural	443,157	45,949	91,692	200,023	337,664	4,721	52,760	57,481	52,760	508,392	45,949	52,760	508,392	45,949	52,760	508,392	45,949	135,139	135,139
	Total	702,575	194,625	119,718	250,983	565,326	38,898	394,537	399,279	394,537	399,279	394,537	399,279	394,537	399,279	394,537	399,279	394,537	282,291	282,291



services. This additional service coverage in urban area includes the upgrade of service level for 79,000 persons served by Level I and II facilities in 1997.

## 8.5.2 Sanitation

### (1) Household toilets

The service coverage (number of households to be served) by different types of sanitary facility is estimated by urban and rural area by municipality for the years 2003 and 2010. The future service coverage and additional households to be served are estimated to meet the provincial targets using the number of household served in the base year and the number of households in target years.

Additional number of households to be served by different type of facility by urban and rural area by municipality is the shortfall of the number of households to be served in target years comparing with either that in base year or in Phase I (details are referred to Supporting Report). However, when the number of households to be served in target year/s is less than or equal to that in base year, no additional number of households to be served is counted.

In the determination of the number of households to be served by flush type toilet, when the number of households to be served in the target year is higher than in base year, the target coverage is applied with conditions. When the target coverage is higher than Level III water supply coverage, the latter coverage is adopted, while in the other case, the target coverage is applied. In cases where the target coverage is less than that in base year, the base year coverage is adopted.

For Phase I, any type of existing sanitary facilities both in urban and rural areas is to be utilized during Phase I period. For Phase II, water-sealed toilet facilities in Phase I both in urban and rural areas are to be utilized.

The projected number of served households at the end of the Phase I period is 108,200. Additional households to be served totaled to 34,586, of which 37% is urban households and 63% is rural households. While at the end of Phase II period, the number of served households are 190,600 with an additional households to be served at 83,000. Table 8.5.2 provides the number of households to be served by target year for urban and rural areas by municipality.

Table 8.5.2 Additional Number of Households to be Served by Target Year (Household Toilets)

Name of Municipality	Area	Phase I Coverage (2003)										Phase II Coverage (2010)																			
		Total Households					No. of Served Households					Add'l. No. of Households to be Served					Total Households					No. of Served Households					Add'l. No. of Households to be Served				
		Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total					
Alubijid	Urban	1,355	288	749	115	1,522	248		104	352	2,024	941	826	115	1,882	653	77	730													
	Rural	4,090	11	2,750	307	3,068		1,414	265	1,679	6,018	11	5,279	307	5,597	2,529		2,529													
	Total	5,445	299	3,499	422	4,220	248	1,414	369	2,031	8,042	952	6,105	422	7,479	653	2,606	3,259													
Balingasag	Urban	2,711	576	1,498	230	2,304	568		80	1,003	3,936	1,830	1,600	230	3,660	1,254	102	1,356													
	Rural	7,313	8	4,928	549	5,485		2,067		2,067	10,799	8	9,486	549	10,043	4,558		4,558													
	Total	10,024	584	6,426	779	7,789	568	2,422	80	3,070	14,735	1,838	1,108	779	13,703	1,254	4,660	5,914													
Balingoan	Urban	789	168	436	67	671	165		67	232	1,072	499	431	67	997	331		331													
	Rural	954		644	72	716		57	129	1,266				1,105	72	1,177	461		461												
	Total	1,743	168	1,080	139	1,387	165	57	199	361	2,338	499	1,536	139	2,174	331	461	792													
Binauangan	Urban	292	62	161	25	248	59		84	459	214			188	25	427	27		27												
	Rural	841	4	564	63	631			63	63	1,182	4	1,032	63	1,099	468		468													
	Total	1,133	66	725	88	879	59		88	147	1,641	218	1,220	88	1,526	152	495	647													
Claveria	Urban	4,685	996	2,588	398	3,982	996	525		525	6,892	3,205	2,807	398	6,410	2,209	219	2,428													
	Rural	5,629	422	3,278	422	4,222	422	2,809		3,231	8,054	1,873	5,193	422	7,490	1,451	1,817	3,268													
	Total	10,314	1,418	5,866	820	8,204	1,418	3,334	4,752	6,462	14,946	5,078	8,002	820	13,900	3,660	2,036	5,696													
El Salvador	Urban	1,476	314	815	126	1,255	314	7	126	447	2,402	1,117	991	126	2,234	803	176	4,977													
	Rural	6,517	489	3,910	489	4,888	489	1,632		2,610	10,607	1,100	8,276	489	9,865	611	4,366	4,977													
	Total	7,993	803	4,725	615	6,143	803	1,639	615	3,057	13,009	2,217	9,267	615	12,099	1,414	4,542	5,956													
Gingoog City	Urban	6,600	3,477	2,099	620	6,196		237	237	8,838	4,119	3,499	620	8,238	642	1,400	2,042	5,650													
	Rural	12,059		8,173	908	9,081			223	223	15,840	3,683	10,140	908	14,731	3,683	1,967	7,692													
	Total	18,659	3,477	10,272	1,528	15,277		237	237	460	24,698	7,802	13,639	1,528	22,969	4,325	3,367	13,342													
Ginigum	Urban	464	99	256	39	394	93		39	132	649	302	263	39	604	203	7	210													
	Rural	1,965	2	1,325	147	1,474		125	137	262	2,708	2	2,369	147	2,518		1,044	1,044													
	Total	2,429	101	1,581	186	1,868	93	125	176	394	3,357	304	2,632	186	3,122	203	1,051	2,154													
Imiao	Urban	1,305	277	721	111	1,109	277		111	388	1,635	761	649	111	1,521	484		484													
	Rural	3,615		2,440	271	2,711		952	952	4,627	4,627	4,032	271	4,303		1,592	1,592	2,076													
	Total	4,920	277	3,161	382	3,820	277	952	1,111	1,340	6,262	761	4,681	382	5,824	484	1,592	2,076													
Jasaan	Urban	4,674	993	2,583	397	3,973	950		360	1,310	7,712	3,586	3,189	397	7,172	2,593	606	3,199													
	Rural	3,218	241	1,932	241	2,414	235	463	74	772	5,291	1,230	3,450	241	4,921	989	1,518	2,507													
	Total	7,892	1,234	4,515	638	6,387	1,185	463	434	2,082	13,003	4,816	6,639	638	12,093	3,582	2,124	5,706													
Kinoguitan	Urban	427	91	236	36	363	90		36	126	730	340	303	36	679	249	67	316													
	Rural	2,056		1,388	154	1,542		652	154	806	3,394		3,002	154	3,156		1,614	1,614													
	Total	2,483	91	1,624	190	1,905	90	652	190	932	4,124	340	3,305	190	3,835	249	1,681	1,930													
Laganglong	Urban	809	172	447	69	688	172		69	241	1,241	577	508	69	1,154	405	61	466													
	Rural	3,010	226	1,806	226	2,258	226	340	226	792	4,641	1,079	3,011	226	4,316	853	1,205	2,058													
	Total	3,819	398	2,253	295	2,946	398	340	295	1,033	5,882	1,656	3,519	295	5,470	1,286	1,416	2,524													
Laguindingan	Urban	546	116	302	46	464	114		46	114	845	393	347	46	786	277	45	322													
	Rural	3,204	240	1,923	240	2,403	240	240	240	4,882	1,135	3,165	240	4,540	895	1,242	2,137														
	Total	3,750	356	2,225	286	2,867	354		354	354	5,727	1,528	3,512	286	5,326	1,172	1,387	2,459													

Table 8.5.2 Additional Number of Households to be Served by Target Year (Household Toilets)

Name of Municipality	Area	Phase I Coverage (2003)										Phase II Coverage (2010)																			
		Total Households					No. of Served Households					Add'l. No. of Households to be Served					Total Households					No. of Served Households					Add'l. No. of Households to be Served				
		Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total						
Libertad	Urban	798	170	440	68	678	168	5	173	1,079	502	433	68	1,003	332																
	Rural	1,279	3	860	96	959	141	65	206	1,829	3	1,602	96	1,701	742																
	Total	2,077	173	1,300	164	1,657	168	141	379	2,908	505	2,035	164	2,704	332	742															
Lugait	Urban	1,409	300	778	120	1,198	280	120	400	1,934	900	779	120	1,799	600																
	Rural	1,851	139	1,110	139	1,388	139	433	711	2,156	501	1,365	139	2,005	362																
	Total	3,260	439	1,888	259	2,586	419	433	259	4,090	1,401	2,144	259	3,804	962																
Magsaysay	Urban	318	61	182	27	270	61	43	104	485	226	198	27	451	165																
	Rural	4,752	3,208	3,564	356	3,564	2,051	2,051	2,051	7,161	6,304	356	6,660	3,096																	
	Total	5,070	61	3,390	383	3,834	61	2,094	2,155	7,646	226	6,502	383	7,111	165																
Manticao	Urban	1,379	293	762	117	1,172	94	73	173	2,152	1,001	883	117	2,001	708																
	Rural	3,503	356	2,008	263	2,627	669	669	669	5,378	356	4,383	263	5,002	2,375																
	Total	4,882	649	2,770	380	3,799	94	742	6	842	7,530	1,357	5,266	380	7,003	708															
Medina	Urban	1,194	254	659	102	1,015	254	102	356	1,723	801	699	102	1,602	547																
	Rural	3,661	275	2,196	275	2,746	275	501	184	960	460	4,253	275	4,988	185																
	Total	4,855	529	2,855	377	3,761	529	501	286	1,316	7,086	1,261	4,952	377	6,590	732															
Naawan	Urban	698	536	60	60	596	48	48	48	951	442	382	60	384	442																
	Rural	2,726	1,840	205	205	2,045	337	337	337	3,619	3,161	205	3,366	1,321																	
	Total	3,424	2,376	2,376	265	2,641	337	48	385	4,570	442	4,250	265	4,250	442																
Opo	Urban	1,721	366	951	146	1,463	354	415	130	899	2,703	1,111	146	2,514	891																
	Rural	4,393	10	2,955	330	3,295	436	436	436	6,858	10	6,038	330	6,378	308																
	Total	6,114	376	3,906	476	4,758	354	851	130	1,335	9,561	1,267	7,149	476	8,892	891															
Salay	Urban	1,412	8	1,072	120	1,200	53	120	173	1,809	841	721	120	1,682	833																
	Rural	2,636	8	1,779	198	1,977	291	291	198	489	3,264	2,838	198	3,036	1,059																
	Total	4,048	16	2,851	318	3,177	344	344	318	662	5,073	841	3,559	318	4,718	833															
Sugbongogon	Urban	765	163	422	65	650	163	65	228	1,229	572	506	65	1,143	409																
	Rural	736	55	442	55	552	55	55	110	1,192	277	777	55	1,109	222																
	Total	1,501	218	864	120	1,202	218	120	338	2,421	849	1,283	120	2,252	631																
Tagoloan	Urban	10,550	2,242	5,829	897	8,968	1,968	897	2,865	19,382	9,013	8,115	897	18,025	6,771																
	Rural	10,550	2,242	5,829	897	8,968	1,968	897	2,865	19,382	9,013	8,115	897	18,025	6,771																
	Total	20,550	4,484	11,658	1,794	11,654	3,936	1,794	5,730	38,764	18,026	16,230	1,794	36,050	13,542																
Talisayan	Urban	978	208	540	83	831	208	96	387	1,456	677	594	83	1,354	469																
	Rural	3,639	2,456	2,729	273	2,729	997	147	1,144	5,310	4,665	273	4,938	2,209																	
	Total	4,617	2,664	3,269	356	3,269	1,294	1,241	1,241	6,760	5,342	567	5,342	7,147	469																
Villanueva	Urban	2,598	552	1,435	221	2,208	500	83	668	4,495	2,090	1,869	221	4,180	1,538																
	Rural	3,229	242	1,938	242	2,422	242	744	986	5,663	1,317	3,708	242	5,267	1,075																
	Total	5,827	794	3,373	463	4,630	742	827	85	1,654	10,158	3,407	5,577	463	9,447	2,613															
Provincial Total	Urban	49,953	12,246	26,497	4,305	43,048	8,096	1,887	11,887	80,956	36,206	31,891	4,305	72,402	23,960																
	Rural	86,876	2,723	55,953	6,521	65,197	2,323	17,111	2,491	127,102	13,049	98,636	6,521	118,206	10,326																
	Total	136,829	14,969	82,450	10,826	108,245	10,419	18,998	5,169	34,586	204,955	49,255	130,527	10,826	190,608	34,286															

(2) School toilets

The service coverage or the number of public school students to be served is estimated by municipality for the years 2003 and 2010.

The future service coverage and additional number of students to be served are estimated using the number of students served in the base year, the number of students in target years and the provincial sector targets.

Additional number of students to be served by municipality is the shortfall of the number of students to be served in targets comparing with either that in base year or in Phase I (details are referred to Supporting Report). However, when the number of students to be served in target/s is less than or equal to the base year, no additional number of households to be served is considered.

The existing facilities are to be utilized during Phase I period, while the facilities in Phase I are to be utilized during Phase II period.

The projected number of served students at the end of Phase I period is 142,300. The additional students to be served are 38,300. While at the end of Phase II period, the projected number of served students are 185,000 with an additional students to be served at 42,800. Table 8.5.3 summarizes the number of public school students to be served by target year.

(3) Public toilets

The service coverage of public utilities with sanitary toilet facility by municipality is estimated for the years 2003 and 2010.

The future service coverage and additional coverage are estimated using the existing number of public utilities with sanitary toilets in the base year, the number of public utilities in target years, and provincial sector targets.

The additional number of public utilities with sanitary toilets needed by municipality is the shortfall of the number of public utilities in target year comparing with either the existing coverage or Phase I coverage (details are referred to Supporting Report).

The existing sanitary facilities are to be utilized during Phase I period. The facilities in Phase I are to be utilized during Phase II period.

Table 8.5.3 Add'l. Number of Public School Student to be Served by Target Year (School Toilets)

Municipality/ City	Phase I Coverage (2003)			Phase II Coverage (2010)		
	Total No. of Public School Student	Std. No. of Public School Students to be Served	Add'l. No. of Public School Student to be Served	Total No. of Public School Student	Std. No. of Public School Students to be Served	Add'l. No. of Public School Student to be Served
Alubijid	6,092	4,874	2,114	7,629	6,866	1,992
Balingasag	13,848	11,078	4,198	15,148	13,633	2,555
Balingoan	2,180	1,744	944	2,367	2,130	386
Binuangan	1,513	1,210	410	1,622	1,460	250
Claveria	15,212	12,170	74	16,365	14,729	2,559
El Salvador	8,615	6,892	410	11,707	10,536	3,644
Gingog City	25,830	20,664	8,224	26,768	24,091	3,427
Gitagum	2,398	1,918	238	2,902	2,612	694
Initao	6,118	4,894	414	6,185	5,567	673
Jasaan	10,310	8,248	2,488	12,815	11,534	3,286
Kinoguitan	2,861	2,289	209	3,710	3,339	1,050
Lagonglong	4,817	3,854	1,694	5,584	5,026	1,172
Laguindingan	4,597	3,678		5,511	4,960	1,282
Libertad	2,723	2,178		2,851	2,566	388
Lugait	3,989	3,191	1,831	4,202	3,782	591
Magsaysay	7,331	5,865	1,825	8,051	7,246	1,381
Manticao	5,476	4,381		6,740	6,066	1,685
Medina	6,566	5,253	1,253	6,839	6,155	902
Naawan	4,152	3,322		4,809	4,328	1,006
Opol	7,652	6,122	3,002	9,575	8,618	2,496
Salay	5,373	4,298	1,618	5,138	4,624	326
Sugbongcogon	2,379	1,903		2,620	2,358	455
Tagoloan	13,708	10,966	4,966	19,371	17,434	6,468
Talisayan	6,230	4,984	264	6,427	5,784	800
Villanueva	7,896	6,317	2,157	10,694	9,625	3,308
<b>Provincial Total</b>	<b>177,866</b>	<b>142,293</b>	<b>38,333</b>	<b>205,630</b>	<b>185,069</b>	<b>42,776</b>

The number of served public utilities at the end of Phase I period is 127. The additional public utilities to be served are 75. While at the end of Phase II period, the number of served public utilities are 202 with an additional public utilities to be served at 75. Table 8.5.4 summarizes the additional number of public utilities to be served by municipality by target year.

Table 8.5.4 Additional Number of Public Utilities with Sanitary Toilets by Target Year (contd)

Municipality/ City	Type	Phase I Coverage (2003)		Phase II Coverage (2010)	
		Add'l. No. of Public Utility with Sanitary Toilets	No. of Public Utility with Sanitary Toilets	Add'l. No. of Public Utility with Sanitary Toilets	No. of Public Utilities with Sanitary Toilets
Kinoguitan	Public Market	1	2	1	3
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	4	3	7
Lagonglong	Public Market	1	1	1	2
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	3	3	6
Laguindingan	Public Market	1	2	1	3
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	4	3	7
Libertad	Public Market	1	3	1	4
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	5	3	8
Lugait	Public Market	1	2	1	3
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	4	3	7
Magsaysay	Public Market	1	3	1	4
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	2	1	3
	Total	3	6	3	9
Manticao	Public Market	1	4	1	5
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	6	3	9
Medina	Public Market	1	2	1	3
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	4	3	7
Naawan	Public Market	1	2	1	3
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	4	3	7
Opol	Public Market	1	2	1	3
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	4	3	7

Table 8.5.4 Additional Number of Public Utilities with Sanitary Toilets by Target Year (Contd)

Municipality/ City	Type	Phase I Coverage (2003)		Phase II Coverage (2010)	
		Add'l. No. of Public Utility with Sanitary Toilets	No. of Public Utility with Sanitary Toilets	Add'l. No. of Public Utility with Sanitary Toilets	No. of Public Utilities with Sanitary Toilets
Salay	Public Market	1	2	1	3
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	4	3	7
Sugbongcoogon	Public Market	1	2	1	3
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	4	3	7
Tagoloan	Public Market	1	2	1	3
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	2	1	3
	Total	3	5	3	8
Talisayan	Public Market	1	2	1	3
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	4	3	7
Villanueva	Public Market	1	2	1	3
	Bus/Jeepney Terminal	1	1	1	2
	Parks/Playground	1	1	1	2
	Total	3	4	3	7
<b>Provincial Total</b>	Public Market	25	65	25	90
	Bus/Jeepney Terminal	25	29	25	54
	Parks/Playground	25	33	25	58
	Total	75	127	75	202

### 8.5.3 Urban Sewerage

The service coverage in 2010 (Phase II) is estimated for the municipalities with population of more than 10,000 in urban area provided by Level III water supply. It is assumed that half of the population in the area/s is to be served by the sewerage systems. Table 8.5.5 shows the population to be served in Phase II.

Table 8.5.5 Population to be Served by Urban Sewerage in Phase II

Municipality/City	Urban Population in 2010	Level III Water Supply Coverage	Population to be Served
Balingasag	15,744	14,957	7,872
Claveria	27,566	26,188	13,783
Gingoog City	35,431	33,659	17,716
Jasaan	30,849	29,307	15,425
Opol	10,811	10,270	5,406
Tagoloan	77,526	73,650	38,763
Villanueva	17,980	17,081	8,990
<b>Provincial Total</b>	<b>311,398</b>	<b>295,828</b>	<b>107,955</b>

#### 8.5.4 Solid Waste

Future requirements in the sub-sector are studied giving priority to urban area for the Phase I. Staged improvement for the rural area shall be studied in the future.

Service coverage in Phase I was assumed at 90% with reference to the present service coverage of 53% in urban area. Additional service coverage in Phase I is calculated as a shortfall of target coverage in Phase I comparing with current service coverage. Table 8.5.6 presents additional service coverage for Phase I in the urban area.

**Table 8.5.6 Additional Number of Urban Households to be Served by Municipal Solid Waste System in Phase I**

Name of Municipality	No. of Urban Households Served in the Base Year	Phase I Coverage (2003)		
		No. of Urban Households	Urban Households Coverage	Add'l. No. of Urban Households to be Served
Alubijid	816	1,198	1,079	263
Balingasag	128	2,410	2,169	2,041
Balingoan		687	619	619
Binuangan		276	249	249
Claveria	442	3,597	3,238	2,796
El Salvador	781	1,219	1,098	317
Gingoog City	13,708	6,197	13,708	
Gitagum		451	406	406
Initao	73	1,298	1,169	1,096
Jasaan	1,486	3,968	3,572	2,086
Kinoguitan		351	316	316
Lagonglong	230	654	589	359
Laguindingan		510	459	459
Libertad		724	652	652
Lugait	1,432	1,284	1,432	
Magsaysay	212	294	265	53
Manticao	831	1,302	1,172	341
Medina		1,109	999	999
Naawan	339	632	569	230
Opol	1,714	1,435	1,714	
Salay		1,348	1,214	1,214
Sugbongcogon		668	602	602
Tagoloan		8,477	7,630	7,630
Talisayan		824	742	742
Villanueva	575	2,012	1,811	1,236
<b>Provincial Total</b>	<b>22,767</b>	<b>42,925</b>	<b>47,473</b>	<b>24,706</b>



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

### 8.6.1 Water Supply

#### (1) Required facilities

Water supply facilities required by service level were estimated by urban and rural area by municipality based on the additional service coverage by target year and summarized in Table 8.6.1 (details are referred to Supporting Report).

##### Urban water supply:

Physical requirements of Level III systems were estimated as the number of required house connections. Mode of project indicates whether future urban water supply will be implemented as expansion of existing system or construction of a new system. The number of water sources was also estimated based on the water source evaluation results in Chapter 7.

##### Rural water supply:

Physical requirements of Level II systems were estimated as the number of systems and number of communal faucets, while that of Level I facilities were first estimated as the number of wells with classification of deep and shallow wells. Deep wells were further subdivided in terms of three different standard depths based on the water source evaluation results.

Furthermore, as for Level I facilities, in this PW4SP, 90% of the total required facilities will be implemented by public (LGUs) and 10% of these public Level I facilities will be allocated to spring development.

#### (2) Rehabilitation

Rehabilitation requirements were estimated as 10% of the total number of deep wells to be constructed under PW4SP. Rehabilitation work will be mainly redevelopment of wells by means of air surging, while minor repair of concrete apron and handpump will be undertaken by respective beneficiary organizations.

Table 8.6.1 Water Supply Facilities Required by Target Year

Name of Municipality	Phase I (2003) Requirements										Phase I (2010) Requirements										
	Urban Water Supply (Level III)					Rural Water Supply					Urban WS (Level III)					Rural Water Supply					
	Mode of Project	No. of Add'l. Deep Wells	No. of HHs Connection	Level II		Level I			No. of Add'l. Deep Wells	No. of HHs Connection	Level I			No. of Add'l. Deep Wells	No. of HHs Connection	Level I			Total No. of Wells		
				No. of System	No. of Communal Faucets	40 m	80 m	120 m			Sub-total	40 m	80 m			120 m	Sub-total	40 m		80 m	120 m
Alubid	Expansion	1	148			19			19					1	983	120			120	13	133
Balingasay	New	1	769	5	100	57		57					2	2,718	106			106	70	176	
Balingasay	Expansion	1	87										37	474	14			14	3	17	
Binuangan	New	1	44	2										374	15			15	15	15	
Clavera	Expansion	1	1,194			8		8					10	3,139	50			50	75	125	
El Salvador	Expansion	1	141			25		25					24	648	122			122	121	243	
Gingoog City	Expansion	1	765											4,496	171			171	18	189	
Gitagum	N/A			1	20									1	107	49		49	49	49	
Initao	N/A					13		13					3	30	56			56	14	70	
Jasaan	Expansion	1	446			7		7					7	5,538	116			116		116	
Kinguitan	Expansion	1	21			9		9					9	344	72			72		72	
Lagonglong	Expansion	1	240			14		14					20	481	36			36	32	88	
Laguindingan	N/A													178	69			69		69	
Libertad	Expansion	1	81	2	40	12		12					8	481	19			19	12	31	
Lugait	N/A													295	33			33		33	
Magsaysay	New	1	12			105		105						445	136			136		136	
Manticao	Expansion	1	114	1	20	10		10					14	985	46			46	69	115	
Medina	N/A					5		5					5	225	45			45	44	89	
Naawan	Expansion	1	99			11		11					25	340	18			18	42	60	
Opol	Expansion	1	918			64		64					42	1,288	92			92	60	152	
Salay	N/A					11		11					1	1,718	37			37	4	41	
Subongcogon	N/A													925	15			15		15	
Talayan	Expansion	1	702											7,693							
Talisayan	New	1	178			38		38					15	1,140	61			61	25	86	
Villanueva	Expansion	1	576			68		68					68	1,746	143			143		143	
<b>Provincial Total</b>	<b>Exp.- 14 New- 4</b>	<b>18</b>	<b>6,535</b>	<b>14</b>	<b>180</b>	<b>363</b>	<b>113</b>	<b>476</b>	<b>206</b>	<b>35</b>	<b>1,455</b>	<b>186</b>	<b>622</b>	<b>36,791</b>	<b>1,641</b>	<b>622</b>	<b>2,263</b>				

### (3) Equipment

#### Logistic support:

For rural water supply development, 1 unit each or set of the following equipment was considered necessary for the provincial government to conduct various activities of PW4SP implementation;

Transportation- service vehicle

Office equipment- computer with printer, typewriter, mimeo machine, scanning machine and copier

Field equipment- sound system, tape recorder and tools for maintenance

For urban water supply, no hardware was considered.

#### Well drilling and rehabilitation equipment:

As a reference information, necessary types and number of well drilling and rehabilitation equipment were studied considering the existing equipment of sector agencies in the province.

During Phase I, a total of 385 Level I deep wells shall be newly constructed by public (LGUs) and 10% of these deep wells shall be rehabilitated annually. Presently, there are 2 units and one unit of percussion type drilling rigs (bit diameter 10") available at the PEO and DPWH-DEO, respectively in the province.

Therefore, a total of 6 sets of drilling rigs (medium size percussion type) together with 1 set of well rehabilitation equipment, 1 unit of support vehicle for well rehabilitation and 6 units of service truck for deep well construction shall be mobilized/procured either by the private sector or LGUs (details are referred to Supporting Report).

#### Selection of well drilling machine

An appropriate type of well drilling machine with its specifications shall be selected after comprehensive study on the technical requirements, local capability in O&M of the machine and cost effectiveness.

From the technical viewpoint, geological conditions in the province allow for the use of either rotary or percussion type drilling machine (no rock drilling is expected). While, in view of economical and O&M experience on the machine in the local area, a percussion type is recommendable. Although, the rotary type machine is quite effective to reduce

construction period under soft soil condition, special training on mud-circulation, handling manner, etc. are required together with additional equipment and materials as compared with percussion type. The drilling speed of the percussion type is rather slow, but has advantages in drilling boulder and cobble formations.

One unit of truck mounted percussion drilling machine was considered to be procured in the long-term development period.

(4) Laboratory

Required New Building:

To ensure periodic examination of the potability of drinking water supplies, a new laboratory facility will be provided in Talisayan to cover the eastern municipalities of Mag-saysay, Gingoog, Medina, Balingoan, Kinoguitan, Sugbongcogon, Binuangan and Salay. The new building will have a floor area of 57m<sup>2</sup> to house an examining laboratory, an office space, a storage room and a toilet. Water and power supplies will be provided.

Instrument/Equipment and Other Laboratory Accessory:

Two (2) sets of instrument/equipment will be necessary to undertake regular water quality monitoring and surveillance activities. The distribution would be: 1 set for the upgrading of the existing provincial laboratory, and the other set, to the new laboratory in Talisayan. The following are the requirements:

Item	Unit	Upgrading of	
		Existing Laboratory	New Laboratory
1. Instrument/Equipment			
Turbidity meter	set	1	1
Color meter	set	1	1
pH/Residual chlorine checker	set	1	1
Incubator	set	x	1
Refrigerator	set	x	1
Sterilizer	set	x	1
Portable water quality testing kit	set	1	1
Electric stove	set	1	1
Range hood	set	1	1
2. Glassware/Chemical	set	1	1
3. Accessory			
Sink	set	x	1
Working table	set	x	1
Shelf	set	x	1
Office desk	set	x	1
Chair	set	x	1

## 8.6.2 Sanitation

This sub-section refers to physical requirements by target year covering household, school and public toilet facilities. Table 8.6.2 presents the required sanitation facilities by target year. Rehabilitation for the sanitation facilities is considered as part of recurrent cost.

### (1) Household toilets

Future requirements in the number of household toilets by different type for urban and rural areas were estimated based on the additional households to be served by type of facility both for urban and rural areas by target year (details are referred to Supporting Report).

### (2) School toilets

The future requirements in the number of toilet facilities were estimated based on the standard number of students to be served by a 5-unit standard facility and the additional students to be served by target year (details are referred to Supporting Report).

Total required facilities were further broken down into urban and rural areas by applying the percentage share of urban and rural population.

### (3) Public toilets

Future requirements in the number of toilet facilities were estimated based on the additional number of toilets for public markets and bus/jeepney terminals located in urban areas (details are referred to Supporting Report).

## 8.6.3 Urban Sewerage and Solid Waste

Physical requirements for the sewerage facilities are not discussed in this sub-section. Further study shall be conducted in the future.

As reference information, the number of refuse collection trucks is estimated for the urban area in Phase I. Twenty two (22) additional units of truck are required to meet assumed service coverage as reflected in Table 8.6.3.

Table 8.6.2 Sanitation Facilities Required by Target Year

Name of Municipality	Phase I (2003) Requirements										Phase II (2010) Requirements										
	Urban Sanitation					Rural Sanitation					Urban Sanitation					Rural Sanitation					
	No. of Households			No. of Public Sch. Toilets	No. of Public Toilets	No. of Households			No. of Public Sch. Toilets	No. of Public Toilets	No. of Households			No. of Public Sch. Toilets	No. of Public Toilets	No. of Households			No. of Public Sch. Toilets	No. of Public Toilets	
	Flush	VIP/ Dry	Total			Flush	VIP/ Dry	Total			Flush	VIP/ Dry	Total			Flush	VIP/ Dry	Total			Flush
Abubjid	248	104	352	3	1	1	1,414	265	1,679	8	653	77	720	3	1	1	2,529	2,529	25	25	
Balmasing	568	355	923	6	1	1	2,967	72	129	3	1,234	102	1,336	3	1	1	4,558	4,558	50	50	
Banungon	165	67	232	2	1	1	57	63	120	3	331	27	358	1	1	1	461	461	6	6	
Binuangan	59	25	84		1	1	422	2,809	3,231	1	132	219	179	6	1	1	468	468	5	5	
Claveria	996	525	1,521		1	1	439	1,632	2,071	2	803	176	979	3	1	1	1,451	1,817	3,268	40	
El Salvador	314	7	321	15	1	1	233	223	456	26	642	1,400	2,042	6	1	1	3,683	1,967	5,650	77	
Guilgoog, City		237	237				125	137	262		203	7	210				1,044	1,044	11	11	
Guilgoog, Village	93	39	132				952	952	1,904	2	484		484				1,592	1,592	21	21	
Jimbar	277	111	388				235	463	74	772	5	2,593	606	3,199	10	1	1	989	1,518	2,507	23
Jujan	950	360	1,310	7	1	1	632	1,544	2,176	5	249	67	316				1,614	1,614	14	14	
Kinoguluan	90	36	126				226	340	566	7	405	61	466				853	1,205	2,058	20	
Laganglong	172	69	241	2	1	1	240	240	480		277	45	322				895	1,242	2,137	21	
Layundingan	114		114				141	65	206		332		332				742	742	8	8	
Liberud	168	5	173				139	433	572		600	1	601				362	255	617	10	
Lugait	280	120	400	4	1	1	2,051	139	2,190	5	165	16	181				3,096	3,096	34	34	
Manticao	61	43	104				669	669	1,338		708	121	829	2	1	1	2,375	2,375	22	22	
Magsaysay	94	73	167				275	501	776	5	547	40	597				153	2,057	2,242	23	
Medina	254	102	356	2	1	1	337	337	674		442		442				1,521	1,521	17	17	
Naawan	48	48	96				436	436	872	11	891	160	1,051	4	1	1	3,083	3,083	31	31	
Opol	354	415	769	4	1	1	291	198	489	5	833		833				1,059	1,059	15	15	
Sadya	53	53	106	3	1	1	55	55	110		409	84	493				222	335	557	6	
Sugboingogon	163	65	228				6,771	2,286	9,057		6,771	2,286	9,057	32	1	1	2,309	2,309	23	23	
Talibayan	1,968	897	2,865	25	1	1	997	147	1,144		469	54	523				1,075	1,770	2,845	27	
Talisayan	208	96	304				242	744	986	6	1,538	434	1,972	7	1	1	10,326	42,653	51,099	573	
Villanueva	500	83	583	5	1	1	2,223	17,111	19,334	110	21,960	5,983	29,943	77	25	25	10,326	42,653	51,099	573	
Provincial Total	8,096	1,897	9,993	78	25	25	24,911	21,925	46,836	1,120	31,960	5,983	37,943	77	25	25	10,326	42,653	51,099	573	

**Table 8.6.3 Number of Refuse Collection Trucks Required in Phase I**

Municipality/City	Additional Urban Households to be Served	Estimated Daily Amount of Refuse to be Generated, (Kg)	Number of Collection Truck Required
Alubijid	263	110	1
Balingasag	2,041	854	1
Balingoan	619	259	1
Binuangan	249	105	1
Claveria	2,796	1,169	1
El Salvador	317	133	1
Gingoog City			
Gitagum	406	170	1
Initao	1,096	459	1
Jasaan	2,086	872	1
Kinoguitan	316	133	1
Lagonglong	359	151	1
Laguindingan	459	192	1
Libertad	652	273	1
Lugait			
Magsaysay	53	23	1
Manticao	341	143	1
Medina	999	418	1
Naawan	230	97	1
Opol			
Salay	1,214	508	1
Sugbongcogon	602	252	1
Tagoloan	7,630	3,190	1
Talisayan	742	311	1
Villanueva	1,236	517	1
<b>Provincial Total</b>	<b>24,706</b>	<b>10,339</b>	<b>22</b>

### 8.7 Identification of Priority Projects for Medium-Term Development Plan

In general, the present service coverage by municipality with reference to the target coverage indicates the direction of development effort for implementing PW4SP with municipal priorities.

Specific projects shall be selected subject to detailed studies and will not be discussed in the provincial master plan. In addition, pertinent information to identify priority projects is not available both at provincial and municipal level during this PW4SP preparation, except some future expansion work for WDs.

The general criteria for identifying priority projects as guide for implementing the PW4SP are summarized below.

The first level of priority should be given to projects with positive feasibility studies and identified funding. Next level of priority should be given to projects with positive feasibility studies, although no funding source has been identified. The third level should be for which feasibility study has been conducted. Within each level, if funds were insufficient, a ranking could be carried out applying some factors, such as willingness to pay, water-related diseases status and per capita cost. Under the above-mentioned conditions, the implementors should prepare a list of projects.

Due attention shall be paid on the importance of integrated development of relevant sub-sectors to maximize the effects and benefits through simultaneous implementation of water supply and sanitation projects. On a municipal level priority, synthetic evaluation of sector components for concerned municipalities (which is studied in the financial arrangements, Chapter 11) may be used for implementation arrangements.

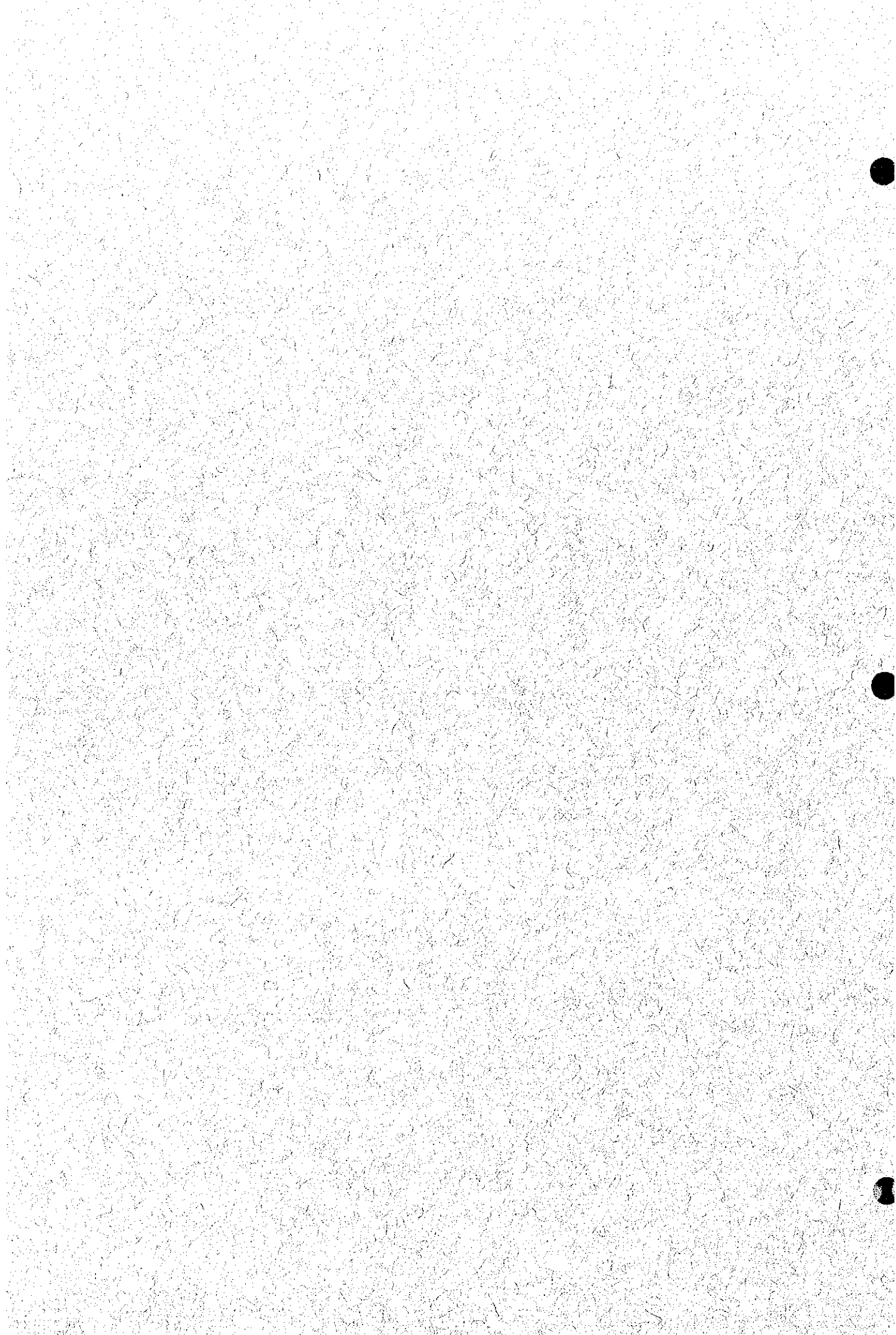


Chapter

9

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**SECTOR MANAGEMENT FOR  
MEDIUM-TERM DEVELOPMENT**



## 9. SECTOR MANAGEMENT FOR MEDIUM-TERM DEVELOPMENT

### 9.1 General

In order to manage the water and sanitation sector effectively, the provincial and municipal governments will have to make some adjustments in their current structures and policies. This Chapter proposes the mechanisms, processes and structures needed in the medium-term to achieve the coverage targets with sustainability. Not all recommendations can be laid out with the same level of detail at this time as some are dependent on further policy guidelines being formulated at the national level. These include the on-going study on access of LGUs to external financing assistance and the sector devolution process.

### 9.2 Sector Management

#### (1) Development of the vision

One glaring institutional need at the local level is a common vision and mission statement for the sector. A critical mass of people and resources that share in the vision must be identified and harnessed for project implementation. Local planners need to focus on the long-term requirements i.e., beyond forming users' associations, drilling wells, distributing bowls, etc. Based on a realistic assessment of constraints, opportunities and demand, the province has set its vision and mission for the sector.

Initial vision statement: The province will adopt a two-phased plan, which seeks to dramatically improve the provision of water supply and sanitation. In the medium-term (1999-2003) plan, the province seeks to increase water supply coverage in urban areas to 87% and in rural areas to 75%. On the other hand, household toilets will be made available to 85% of the population and 75% of the rural population; 80% of the students in public schools will have adequate sanitary toilet facilities; 100% of public utilities will have sanitary toilets; and 90% of the urban population will be covered by solid waste collection services. For its long-term (2004-2010) plan, the province will pursue a more vigorous program to increase water supply coverage in urban areas to 95% and in rural areas to 93%. For the sanitation sub-sector, individual household toilets will increase up to 93% in both urban and rural areas; public school toilets will rise up to 90%; public utilities will have 100% sanitary toilet coverage; while sewerage service will cover 50% of the urban population.

(2) Sector management

A Sector Management Model is presented in Figure 9.2.1 for sector management and project development. It is envisaged that this PW4SP will be used as a basis for the Annual Sector Plan and/or as an input into Loan or Grant Negotiations in the future. The Annual Sector Plan, together with the budgets, will be reviewed by the Governor and passed upon by the legislation as part of the annual provincial budget approval process.

The sector level implementation activities consist principally of three broad areas: social marketing; technical assistance; and monitoring. Project selection follows on from a self-selection process. The identification of a responsible community-based association and technical studies, as needed, will be done. Construction or rehabilitation will take place only after the institutional, financial and technical studies have been done. Operation and maintenance, including arrangements for finances of the system, will be the responsibility of the community organization. The Monitoring Function, on the other hand, will be augmented with water quality surveillance by the Provincial Health Office (PHO) and operational audits done by the LGU.

(3) Service provision policies and objectives

The LGU seeks to provide an adequate level of water and sanitation facilities defined as follows:

- Level I facilities serve at most 15 (fifteen) households per source; Level II public taps serve 5 (five) households per faucet; and Level III systems provide individual household connections.
- Water supply provision will be at least 20 lpcd for Level I; 60 lpcd for Level II; and 100 lpcd for Level III.
- A critical mass of 90% of the individual households in every barangay has sanitary toilet facilities.
- All schools shall have adequate water supply and at least one sanitary toilet facility for every 40 students.

(4) Operating policies

The following policy and strategy statements are adopted by the Provincial Government. These may be reviewed and revised from time to time by the Provincial Government. The key policy statements include the following:

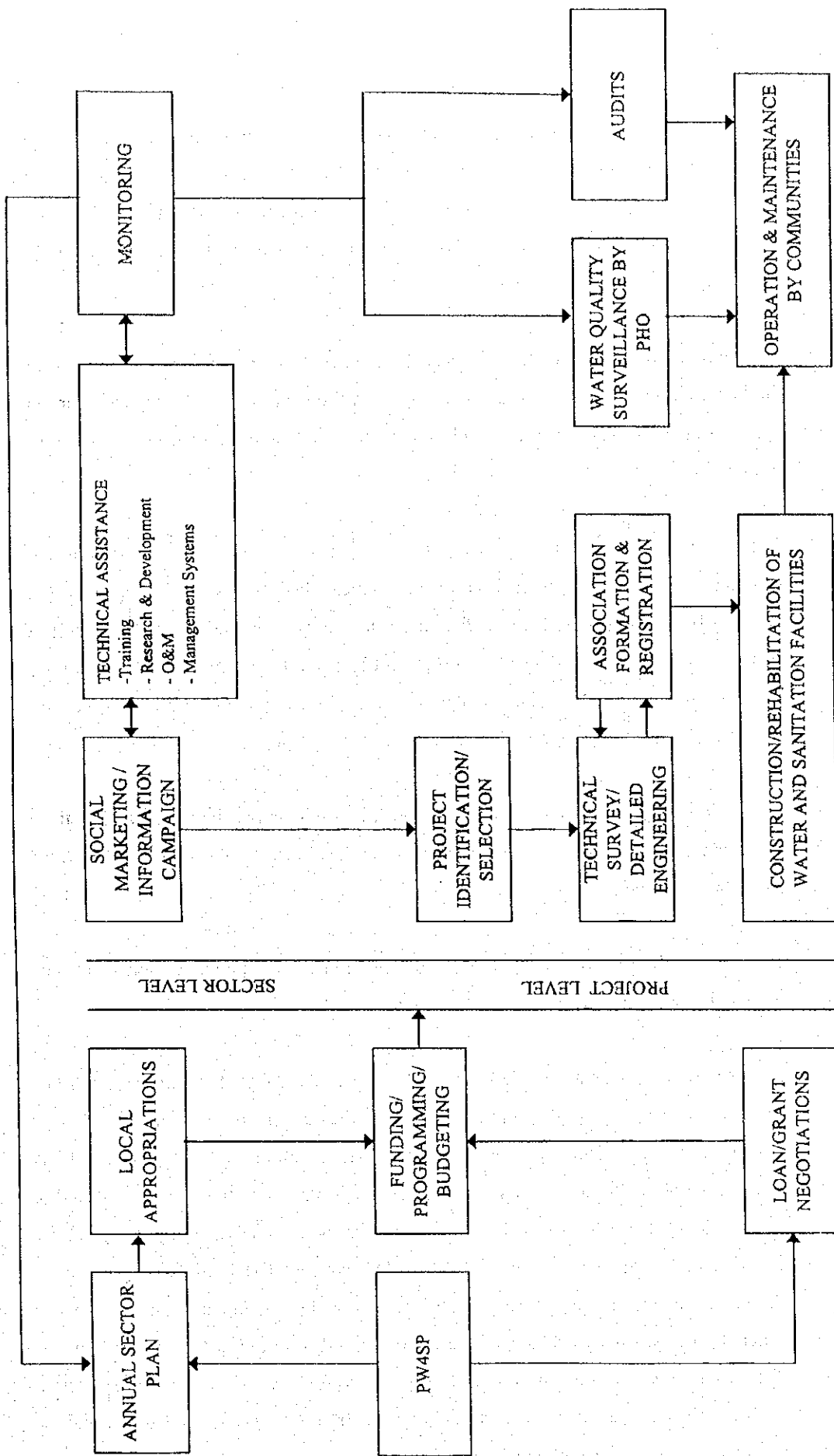


Figure 9.2.1 Sector Management Model

- 1) Sustainability shall be promoted through increased community responsibility for the management of facilities. Unless potential users demonstrate initiative and commitment (beyond making the request for assistance) to maintain the systems, no support shall be provided by the LGUs. To the extent possible, the LGUs should utilize existing local resources (self-reliance).
- 2) Selection and prioritization of projects shall be based on demonstrated commitment of the beneficiaries to participate in the project and their willingness to pay; the current water, sanitation and overall health conditions; potentials for growth; and cost implications.
- 3) Technology to be used for the projects shall be appropriate to the local conditions and resources. However, construction of economical facilities shall be pursued not necessarily insisting on low-cost. Phased upward integration and future upgrading of systems and facilities shall also be promoted utilizing to the extent possible previously constructed facilities. In urban centers, a range of technologies may be adopted for wastewater collection and treatment, as well as for drainage.
- 4) An integrated approach to the provision of potable water supply, sanitation and hygiene education shall be promoted. All projects to be developed by the LGU must involve these three elements.
- 5) The LGU shall seek to provide water and sanitation in an equitable manner between rural and urban areas; between wealthy and depressed areas.
- 6) Cost Recovery and Cost Sharing (Subsidy Policies): The LGU shall enforce a rational and consistent policy on the application of subsidies and loans for water supply and sanitation. In May 1996, the Investment Coordination Committee (ICC) of the NEDA adopted a policy "to support the financing of devolved activities with social and/or environmental objectives" based on three considerations namely: Equity, Externalities and Economies of Scale. Accordingly, NEDA advised DILG of the revised cost-sharing arrangement which clearly limited the national government subsidy to Level I water supply systems for 5<sup>th</sup> and 6<sup>th</sup> class municipalities up to a maximum 50% of the total project cost. No subsidy from GOP is provided for Level II and III. For sanitation facilities, the national government subsidy for the 3<sup>rd</sup> to 6<sup>th</sup> class municipalities shall be from 50% to 70% of the total project cost.

- 7) Private Sector Participation: The government shall give the private sector a substantial and preferential role in the attainment of the PW4SP objectives. In harnessing their participation, less government intervention shall be exercised in areas where the private sector is or can be a key player. An environment designed to empower them to absorb new social responsibilities and proactively convey to the government their aspirations and interests shall be established. The formation of private sector groups, NGOs, community organizations, cooperatives and people's organizations shall be encouraged. The implementation of programs to develop their capabilities in the sector development programs shall be promoted.
- 8) The province's fiscal management, in terms of capital funds generation capability, budget and disbursement, shall be improved. The assistance of the legislative branch in the enactment of the proposed revenue-generating measures shall be sought. Financing through the private sector will also be encouraged.
- 9) Sector development shall be consistent with broader concerns for environmental protection and management. Pollution control, conservation and proper utilization of water and land resources are critical issues. An environmentally responsive management approach to resource use shall be pursued.
- 10) Disaster Response and Emergency Coordination: The LGU shall formulate, as part of its contingency plans, a program to address emergency conditions. The program shall include maintenance of stocks of chlorine, organization and training of local communities on restoration of water supplies and provision of emergency sanitary facilities. The LGU should coordinate closely and regularly with the local officials of the Regional Disaster Coordinating Council (RDCC).

(5) Regulatory policies

In coordination with appropriate national and local agencies, the LGU shall endeavor to set up an effective regulatory framework considering the following:

- 1) Water allocation and water rights policies (conflict resolution) which are within the mandate of the National Water Resources Board. The LGUs or the concerned water utility shall apply for water rights from the Board, prior to implementing a project that would require extraction of water.

- 2) Water Rate Review: While the rate setting and approval functions remain largely as a concern of the associations or the Water Districts (and LWUA), a vehicle for resolving grievances against unrealistic tariffs (or other practices) can be instituted by the LGUs. The court system, of course, remains as the final arbiter in conflicts.
- 3) Association Registration: The LGUs shall likewise adopt a registration and franchising system for associations responsible for water supply facilities outside the WD franchise areas. Annual reporting requirements will have to be established for monitoring and possibly, auditing purposes.
- 4) Water Quality: The National Drinking Water Standards have been established. The LGUs will have to establish a viable mechanism, including water testing and standards enforcement, to ensure that water delivered meets the potability standards. The DOH currently has the responsibility and the regulatory power to stop the operations of water systems not delivering potable water.

(6) Financing system

In financing water supply investments, the LGUs may tap their Internal Revenue Allotment and/or locally generated revenues, or leverage these resources to borrow from government and private financial institutions. Overall, it is the LGU's responsibility to raise funds to support capital development sector projects and to ensure that adequate O&M reserves are raised by the beneficiary communities.

In the medium-term, the primary sources of funds are envisaged to be provincial & local taxes, allocation from the IRA 20% Development Fund and Municipal Development Fund. Also, in the medium-term, it is envisaged that national & external funds will, although diminishing, continue to be channeled through local offices of central agencies.

Studies are underway to look into the feasibility of direct access of LGUs to external funds. The LGU will continue to monitor the developments and policy decisions to be established as these will invariably affect local financing mechanisms.

To support sanitation activities, housing improvement loans for installing in-house sanitary facilities should be studied and instituted by the LGU. Such a mechanism can be organized with the rural banks or the existing credit cooperatives. Seed funding for this revolving fund also needs to be raised. Upon agreement by the parties, the enabling local legislation establishing the sanitation revolving fund will have to be enacted.