

Table 7.5.2 Water Quality Analysis Results

Indices	Unit	Class "A" Water Quality Criteria for Fresh Surface Water	River		Remarks
			Laoag (Padsan)	Vintar (Bislak)	
Color	units	50	5.00	5.00	within standard
Turbidity	units	-	65.00	25.00	
Conductivity	us/cm	-	170.00	230.00	
pH		6.5-8.5	7.50	8.10	within standard
Alkalinity	mg/L	-	64.00	111.00	
Total Hardness as CaCO ₃	mg/L	400	65.00	96.00	within standard
Sulfate (SO ₄)	mg/L	200	21.00	18.00	within standard
Chloride (Cl)	mg/L	200	2.70	2.70	within standard
Iron (Fe)	mg/L	1.0	0.30	1.10	
Manganese (Mn)	mg/L	0.5	0.01	0.01	within standard
Ammonia-Nitrogen	mg/L	-	0.44	0.52	
BOD	mg/L	5	92.30	111.55	excessive

Most of the indices meet the criteria set for Class "A" fresh surface water. However, the iron content of Vintar river slightly exceeds the limit of 1.0 mg/L. This is attributed to the iron-rich rocks which forms part of the drainage system, particularly the older formations. Likewise, the computed Biochemical Oxygen Demand (BOD: assumed conversion rate is BOD/COD = 1/2) of the two rivers is beyond the criteria for Class "A" fresh surface water. High BOD is assumed to be caused by presence of organic suspended solids, such as debris of plants, trees and eroded surface soil.

7.6 Future Development Potential of Water Sources

The questionnaires collected from each municipalities show that there are 16,757 wells existing in the province, while 605 wells are recorded in the inventory made by NWRB (See Tables 7.11 and 7.3.1, Data Report). Despite the smaller number of wells included in NWRB data, they were used in the analysis since technical information are provided. Of the total 605 wells, 334 have complete information; depth, static water level and specific capacity; and are summarized in Table 7.6.1.

Considering the well information, the most productive wells are those with depth ranging from 6 to 60 m and from 80 to 120 m. Wells drilled between 60 and 80 m are notably having low specific capacity. The good yielding wells in the province have static water level ranging from 3 to 10 mbgl and specific capacity of 0.5 to 24.3 l/sec/m of drawdown.

Table 7.6.1 Well Sources Information*

Municipality	Type	Number	Depth (m)		SWL (m)		Sp. Cap. (l/sec/m)	
			Ave.	Range	Ave.	Range	Ave.	Range
Adams	SW	***						
	DW	***						
Bacarra	SW	11	12.99	8.23 - 18.90	3.30	1.52 - 4.57	1.10	0.41 - 2.10
	DW	3	27.93	21.30 - 36.59	8.15	3.10 - 13.72	0.55	0.21 - 1.03
Badoe	SW	12	13.01	10.36 - 18.29	4.31	1.56 - 7.62	1.09	0.21 - 4.00
	DW	12	44.83	23.17 - 100.50	8.03	0.08 - 27.44	2.46	0.04 - 24.34
Bangui	SW	2	13.80	12.10 - 15.50	5.49	4.27 - 6.71	0.96	0.88 - 1.03
	DW	5	32.76	20.73 - 47.50	6.77	3.66 - 13.72	0.44	0.10 - 1.04
Batac	SW	7	15.28	12.19 - 19.80	3.35	0.61 - 7.62	1.67	0.52 - 5.20
	DW	15	45.62	21.30 - 108.23	4.78	2.13 - 6.71	0.61	0.04 - 3.45
Burgos	SW	4	13.34	9.15 - 17.68	3.42	2.44 - 5.13	0.46	0.05 - 0.82
	DW	2	23.12	21.34 - 24.90	3.05	3.05 - 3.05	1.04	1.03 - 1.04
Carassi	SW	***						
	DW	***						
Corrimao	SW	11	10.52	6.69 - 12.70	3.01	1.56 - 4.57	1.77	0.26 - 4.15
	DW	1	22.00	22.00 - 22.00	1.52	1.52 - 1.52	0.35	0.35 - 0.35
Dingras	SW	12	11.11	6.71 - 19.80	2.31	1.22 - 4.57	1.24	0.14 - 4.14
	DW	9	38.23	21.95 - 121.95	4.67	0.23 - 13.72	1.62	0.05 - 4.80
Dumalneg	SW	***						
	DW	***						
Espiritu	SW	13	14.60	6.70 - 19.80	2.91	1.22 - 6.10	0.99	0.19 - 2.53
	DW	17	29.50	20.70 - 44.21	9.06	4.27 - 15.24	0.32	0.03 - 2.14
Laog City	SW	40	13.07	5.79 - 19.82	3.74	0.61 - 10.06	1.52	0.15 - 3.20
	DW	14	45.22	22.86 - 219.53	5.38	1.52 - 12.20	3.99	0.04 - 41.38
Marcos	SW	2	4.55	0.00 - 9.10	6.07	4.52 - 7.62	0.25	0.21 - 0.30
	DW	1	21.30	21.30 - 21.30	2.44	2.44 - 2.44	0.14	0.14 - 0.14
Nueva Era	SW	**	12.00	7.00 - 20.00	4.00	0.60 - 9.00	1.00	0.10 - 4.00
	DW	2	32.08	23.00 - 41.16	7.64	4.60 - 10.67	0.40	0.17 - 0.63
Pagudpod	SW	10	6.41	0.00 - 18.20	3.06	1.22 - 5.49	0.61	0.10 - 1.27
	DW	1	21.30	21.30 - 21.30	6.71	6.71 - 6.71	0.69	0.69 - 0.69
Pacay	SW	12	4.70	0.00 - 17.30	4.90	1.52 - 14.02	2.14	0.30 - 9.13
	DW	3	34.87	24.00 - 55.40	9.32	3.05 - 12.70	1.13	0.03 - 2.10
Pasuquin	SW	13	0.00	0.00 - 0.00	4.62	1.52 - 12.20	0.85	0.00 - 6.10
	DW	3	67.13	22.80 - 143.29	3.07	3.05 - 3.11	0.59	0.21 - 1.15
Piddig	SW	15	1.45	0.00 - 12.10	5.91	0.61 - 16.77	1.57	0.04 - 4.20
	DW	2	28.00	21.00 - 35.00	6.88	3.05 - 10.70	0.52	0.21 - 0.82
Pinli	SW	15	7.03	0.00 - 19.82	6.30	1.52 - 11.28	0.31	0.03 - 1.04
	DW	12	36.78	23.78 - 54.88	11.04	0.00 - 30.66	0.39	0.01 - 1.26
San Nicolas	SW	18	3.41	0.00 - 17.60	3.74	0.61 - 10.67	1.16	0.02 - 5.17
	DW	1	25.00	25.00 - 25.00	4.60	4.60 - 4.60	4.30	4.30 - 4.30
Sarrat	SW	15	4.12	0.00 - 18.30	5.06	1.83 - 9.15	0.74	0.04 - 2.53
	DW	3	51.77	27.40 - 67.00	10.57	6.40 - 18.60	2.02	0.10 - 5.27
Solsona	SW	2	3.65	0.00 - 7.30	1.68	1.52 - 1.83	1.03	1.03 - 1.03
	DW	***						
Vintar	SW	6	2.13	0.00 - 12.80	6.30	3.66 - 10.67	0.52	0.04 - 1.67
	DW	8	28.53	23.00 - 35.90	7.80	2.13 - 15.24	0.73	0.06 - 2.80
Provincial	SW	220	8.40	5.79 - 19.82	4.15	0.61 - 16.77	1.17	0.00 - 9.13
	DW	114	38.03	20.70 - 219.53	7.12	0.08 - 30.66	1.31	0.01 - 41.38

Source: NWRB Well Inventory Database.

Notes:

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

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

***No related technical information available.

Legend: SWL=Static Water Level Sp. Cap.=Specific Capacity Ave.=Average
 SW=Shallow Well DW=Deep Well

Based on the hydraulic characteristics and distribution of wells in Ilocos Norte, the good yielding aquifers occur in the Recent deposits. These are widespread in the northwest side of the major fault that traverse from Badoc to Pagudpud and in an enclosed valley covering parts of Piddig, Marcos, Solsona, Dingras and Espiritu. The aquifers in the Plio-Pleistocene rocks, which are also located where extensive Recent deposits occur, are expected to have good to moderate yields. Moderate yielding aquifers are anticipated in the Miocene limestone and the upper fractured portions of the older formations

As indicated in various data obtained, areas with high salinity problem are concentrated in Bacarra, Laoag, San Nicolas, Sarrat, Batac, and Paoay. These areas are contiguous municipalities that have high population density and have more number of shallow wells. Areas with high iron and manganese concentration are likewise found in the adjoining municipalities of Pasuquin, Bacarra, and Vintar. In Laoag City, odorous and yellowish color water were reported, but the extent is localized.

As an alternative to wells, the untapped springs identified can be developed. These are also the most practical sources of water supply in the areas considered as difficult for well development, particularly in the eastern mountainous municipalities of Adams, Dumalneg, Nueva Era, Carassi, parts of Pagudpud, Bangui, Burgos, and Solsona. The major faults dissecting the province provide interconnected fractures in the various rock units favorable for spring occurrences.

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

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

Table 7.6.2 Hydrogeological Description by Municipality

MUNICIPALITY	TOPOGRAPHY	EXISTING CONDITIONS											DATA INTERPRETATION								
		GEOLOGIC UNITS (%)				WELL INFORMATION				SPRINGS			GROUND WATER AVAILABILITY (%)			AQUIFER FORMATION	ESTIMATED AQUIFER DEPTH RANGE (mbgl)	OTHERS			
		R	N3	N2	N1	O	DEPTH (m)	SW	DW	SW	DW	SW	DW	SW	DW				DF		
		(%)	(%)	(%)	(%)	(%)	(m)	SWL (mbgl)	AVE. SWL (mbgl)	AVE. SWL (mbgl)	MAX. (AVE.) SP. CAP. (1/s/m)	NO. TAPPED	NO. UNTAPPED	NO. AVE. Q (1/s)	NO. AVE. Q (1/s)	SW	DW	DF			
Laoag	flat to hilly	60	30	10	0	0	6-20	23-220	4	6	0.15-3.2 (1.52)	41.38 (3.99)	0.04-0.04	2	2	0	100	0	Alluvium/Plio-Pleistocene rocks	4-60/80-120	Potential aquifers are expected in the broad alluvial and plain and low relief hills with estimated Sp. Cap. of 2.0-2.5 1/s/m. High calcium in some 1NWD's infiltration wells probably due to limestone appearing in La Paz area. H ₂ S in some wells in Saler-Bulanogon high Cl in some SW.
Adams	mountainous	0	0	0	5	95	-	-	-	-	-	-	-	1	-	0	100	0	Fractured Miocene and Older rocks	-	Largely spring area.
Bacarra	flat to hilly	60	40	0	0	0	9-20	22-37	3	8	0.41-2.10 (1.1)	0.21-1.03 (0.55)	3	3	5	100	0	Alluvium/Plio-Pleistocene rocks	3-60/80-120	Potential aquifers occur in the broad alluvial plain and low relief hills with estimated specific capacity of 2.0-2.5 1/s/m. Confining clay exist from near surface to 25 m. High Mn and Cl in some WD shallow wells.	
Badoc	flat to hilly	35	25	20	0	20	11-19	24-101	4	8	0.21-4.0 (1.09)	24.34 (2.46)	10	2	80	20	0	Alluvium/Plio-Pleistocene rocks	4-40/80-120	Potential aquifer occur in the alluvial plain and low relief hills with estimated specific capacity of 2.0-2.5 1/s/m. High iron was reported in BWD's well in Bagg, Canaan, along the National Road and in a well in Carrera (also high in TDS).	
Banguai	hilly to mountainous	-	25	10	30	35	13-16	21-48	6	7	0.88-1.03 (0.96)	0.10-1.04 (0.44)	16	-	65	35	0	Alluvium/Plio-Pleistocene rock	6-40/80-120	Potential aquifer occur in the alluvial plain and low relief hills with estimated specific capacity of 1.0 to 2.0 1/s/m for alluvial and sandstone aquifers, respectively. No water quality information	
Bataac	flat to hilly	25	60	15	0	0	13-20	22-109	3	5	0.23-5.2 (1.67)	3.45 (0.61)	9	1	100	0	0	Alluvium/Plio-Pleistocene rock	3-60/80-120	Potential aquifers occur in the alluvial plain and low relief hills with estimated specific capacity of 2.0-2.5 1/s/m for alluvial and Plio-Pleistocene aquifers, respectively. Brackish water exists up to Poblacion	

Table 7.6.2 Hydrogeological Description by Municipality

MUNICIPALITY	TOPOGRAPHY	EXISTING CONDITIONS												DATA INTERPRETATION							
		GEOLOGIC UNITS (%)			WELL INFORMATION						SPRINGS			GROUND WATER AVAILABILITY			AQUIFER FORMATION	ESTIMATED AQUIFER DEPTH RANGE (m)	OTHERS		
		R	N3	N2	N1	O	DEPTH (m)		AVE.		MAX./AVE.		TAPPED		UNTAPPED					SW	DW
							SW	DW	SWL (m)	DW	SW	DW	SP. CAP. (l/s/m)	SW	DW	NO.	AVE. Q (l/s)	NO.	AVE. Q (l/s)		
Burgos	hilly to mountainous	5	0	45	30	20	10-18	22-25	3	3	0.05-1.03	0.82	1.04	5	2	0	80	20	Alluvium/Miocene limestone	3-40	Potential aquifers are expected in the plain, limestone plateau and re-filled valleys with sp. capacity of 1.0-1.5 l/s/m. Water quality is probably hard due to limestone. Numerous springs may exist.
Casassi	mountainous	0	0	0	10	90	-	-	-	-	-	-	6	-	0	0	100	0	Fractured Miocene to Older rocks	-	Largely spring area.
Currimao	undulating	15	85	0	0	0	7-13	22	3	2	0.26-4.15	0.35	(0.35)	0	1	0	100	0	Alluvium/ (Plio-Pleistocene rocks)	3-60/80-120	Potential aquifers are expected in the alluvial plain on the north and low relief hills with estimated specific capacity of 2.0-2.5 l/s/m for alluvial and Plio-Pleistocene aquifers, respectively. Brackish water is probable along the coast.
Dingras	flat to hilly	100	0	0	0	0	7-20	22-122	2	5	0.14-4.14	0.05	4.80	7	0.02	0	100	0	Alluvium	2-60	Potential aquifers are expected in the broad hill-locked valley and footslope with estimated specific capacity of 1.5-2.5 l/s/m. No water quality information.
Dumaling	mountainous	0	5	0	5	90	-	-	-	-	-	-	4	3.33	-	0	100	0	Plio-Pleistocene rocks	5-40/80-120	Generally spring area, but deep well is possible in the valley flat and footslope along Bulu river in the northern with sp. cap. of 1.0 l/s/m. No water quality information.
Espritu	flat to undulating	30	40	30	0	0	7-20	21-45	3	9	0.19-2.53	2.14	(0.32)	2	8.69	0	100	0	Alluvium/ Plio-Pleistocene rocks	3-60/80-120	Potential aquifers are expected in the broad hill-locked valley and footslope with estimated specific capacity of 1.5-2.0 l/s/m. No water quality information.
Marcos	flat to hilly	85	5	10	0	0	10	22	6	2	0.21-0.3	0.14	(0.14)	5	3	0	100	0	Alluvium/ Plio-Pleistocene rocks	6-60/80-120	Potential aquifers are expected in the broad hill-locked valley on the east section and footslope with estimated specific capacity of 1.5-2.5 l/s/m. No water quality information.

Table 7.6.2 Hydrogeological Description by Municipality

MUNICIPALITY	TOPOGRAPHY	EXISTING CONDITIONS													DATA INTERPRETATION						
		GEOLOGIC UNITS (%)				WELL INFORMATION					SPRINGS				GROUND WATER AVAILABILITY (%)	AQUIFER FORMATION	ESTIMATED AQUIFER DEPTH RANGE (mbsgl)	OTHERS			
		R	N3	N2	N1	O	DEPTH (m)	SW	DW	SW	DW	AVE. SWL (mbsgl)	AVE. (AVE.)	TAPPED					UNTAPPED	SW	DW
														NO.	AVE. Q (l/s)	NO.	AVE. Q (l/s)				
Nueva Era	undulating to mountainous	5	5	0	0	90	7-20	4	3	0.10-4.20 (1.0)	0.17-0.63 (0.40)	10	6.33	-	-	0	10	90	Alluvium/Plio-Pleistocene rocks	5-60/80-120	Generally spring area, but wells can be developed in the alluvium & Plio-Pleistocene rocks with estimated sp. cap of 1.0-2.5 1/2m. No water quality information.
Pagudpud	hilly to mountainous	-	40	0	0	60	8-19	22	3	0.10-1.27 (0.61)	0.69 (0.69)	17	1.01	1	-	0	40	60	Alluvium/Plio-Pleistocene rocks	5-40/80-120	Potential aquifers occur in the alluvial plain, tidal flat and inland valleys with estimated specific capacity of 1.0-2.0 1/2m for alluvial and Plio-Pleistocene aquifers. No water quality information.
Paoay	flat to undulating	65	35	0	0	0	9-18	23-56	5	0.30-9.13 (2.14)	0.03-2.10 (1.13)	1	-	-	-	0	100	0	Alluvium/Plio-Pleistocene rocks	3-60/80-120	Potential aquifers occur in the broad alluvial plain and low relief hills with estimated specific capacity of 2.0-2.5 1/2m for alluvial and Plio-Pleistocene aquifers, respectively. Brackish water quality is reported in local and hardness in some wells exceeded NSDW limit
Pasauquin	flat to mountainous	10	5	70	0	15	7-13	23-278	5	0.0-6.10 (0.85)	0.21-1.15 (0.59)	9	-	1	-	0	80	15	Alluvium/Plio-Pleistocene limestone	5-60/80-120	Potential aquifers are expected in the alluvial plain and in limestone plateau of Paredes Air Base with specific capacity of 1.5-2.5 1/2m. Water quality is probably hard due to limestone. Numerous springs exist.
Piddig	undulating to mountain	10	30	0	55	5	10-17	21-49	6	0.4-2.0 (1.57)	0.21-0.82 (0.52)	7	-	1	-	0	95	5	Alluvium/Plio-Pleistocene rocks	5-60/80-120	Potential aquifers are expected in the broad hill-topped valley and footslope on the west and south section with estimated specific capacity of 1.5-2.5 1/2m. No water quality information.
Prieta	undulating to mountain	10	60	30	0	0	13-20	21-55	6	0.03-1.04 (0.31)	0.01-1.26 (0.39)	0	0	-	-	0	100	0	Alluvium/Plio-Pleistocene rocks	9-60/70-120	Potential aquifers occur in the alluvial plain and low relief hills with estimated specific capacity of 1.5-2.5 1/2m. No water quality information.

Table 7.6.2 Hydrogeological Description by Municipality

MUNICIPALITY	TOPOGRAPHY	EXISTING CONDITIONS												DATA INTERPRETATION							
		GEOLOGIC UNITS (%)			WELL INFORMATION						SPRINGS			GROUND WATER AVAILABILITY (%)		AQUIFER FORMATION	ESTIMATED AQUIFER DEPTH RANGE (m)	OTHERS			
		R	N3	N2	N1	O	DEPTH (m)	AVE. SWL (m)	AVE. SP. CAP. (l/s/m)	MAX./AVE. SP. CAP. (l/s/m)	TAPPED	UNTAPPED	SW	DW	DF						
		(%)	(%)	(%)	(%)	(%)	(m)	(m)	(l/s/m)	(l/s/m)	NO.	AVE. Q (l/s)	NO.	AVE. Q (l/s)	(%)	(%)	(m)				
San Nicolas	flat to hilly	40	60	0	0	0	10-19	24-48	4	5	0.02-5.17 (1.16)	4.30 (4.30)	6	-	-	0	100	0	Alluvium/Plio-Pleistocene rocks	4-60	Potential aquifers are expected in the broad alluvial plain and low relief hills with estimated specific capacity of 2.0-2.5 l/s/m. High CI in some SW is reported in past studies.
Sarrat	flat to hilly	40	10	50	0	0	10-20	21-67	5	11	0.04-2.53 (0.74)	0.10-5.27 (2.02)	4	2.5	1	0	100	0	Alluvium/Plio-Pleistocene rocks	5-70/80-120	Potential aquifers are expected in the broad alluvial plain on the western half section and foot-slope with estimated specific capacity of 2.0-2.5 l/s/m. High CI was reported in some SW.
Solivena	flat to mountainous	40	0	0	0	60	7-8	21-122	2	-	1.03 (1.03)	-	9	-	-	0	40	60	Alluvium	3-60/80-120	Potential aquifers are expected in the broad hill-locked valley on the west section and footslope with estimated specific capacity of 1.0-2.5 l/s/m. No water quality information.
Vintar	flat to mountainous	1	5	5	79	10	13-19	23-36	6	8	0.04-1.67 (0.52)	0.06-2.80 (0.73)	54	-	-	0	90	10	Alluvium/Plio-Pleistocene rocks	7-60/80-120	Potential aquifers are expected in the broad alluvial plain on the south and in-filled valley on the central section with estimated specific capacity of 1.0 to 2.5 l/s/m for alluvial and Plio-Pleistocene rocks, respectively. Confining clay from near surface to 25 m. High Mn was reported in INWD well.

Note:
 R = Recent Deposits
 N₃ = Late Miocene Rocks
 N₂ = Early Miocene Rocks
 N₁ = Plio-Pleistocene Rocks
 O = Rocks Older than Miocene
 SW = Shallow Well Area
 DW = Deep Well
 DF = Difficult Area
 Q = Discharge/Flow Rate
 m³/m² = meter below ground level
 SWL = Static Water Level
 l/s/m = liter/second/meter (draw-down)
 SP. CAP. = Specific Capacity

Table 7.6.3 Standard Specification of Wells by Municipality*

Municipality	Type	Proportion** (%)	Standard Specification			Remarks	
			Depth Range (m)	SWL (m)	Specific Capacity (l/sec/m)		
Adams	Rural	SW	0	-	-		
		DW	0	-	-		
	Urban	SW	0	-	-		
		DW	0	-	-		
Bacarra	Rural	SW	0	10 < D < 20	5		2.0
		DW	100	20 < D < 60	10		2.0
	Urban	SW	0	10 < D < 20	5		2.5
		DW	100	20 < D < 60	10		2.5
Badoc	Rural	SW	0	10 < D < 20	5	2.0	
		DW	40	20 < D < 60	10	2.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Banguì	Rural	SW	0	10 < D < 20	5	1.0	
		DW	60	20 < D < 40	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.0	
		DW	95	20 < D < 40	10	2.0	
Balac	Rural	SW	0	10 < D < 20	5	2.0	
		DW	100	20 < D < 40	10	2.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 40	10	2.5	
Burgos	Rural	SW	0	10 < D < 20	5	1.0	
		DW	70	20 < D < 40	10	1.0	
	Urban	SW	0	10 < D < 20	5	1.5	
		DW	100	20 < D < 40	10	1.5	
Carassi	Rural	SW	0	-	-		
		DW	0	-	-		
	Urban	SW	0	-	-		
		DW	0	-	-		
Currímao	Rural	SW	0	10 < D < 20	5		2.0
		DW	100	20 < D < 60	5		2.0
	Urban	SW	0	10 < D < 20	5		2.5
		DW	100	20 < D < 60	5		2.5
Dingras	Rural	SW	0	10 < D < 20	5	1.5	1 untapped spring with potential discharge of 1.25 l/sec
		DW	100	20 < D < 60	5	1.5	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	5	2.5	
Dumalneg	Rural	SW	0	-	-		
		DW	0	-	-		
	Urban	SW	0	-	-		
		DW	0	-	-		
Espiritu	Rural	SW	0	10 < D < 20	5		1.5
		DW	100	20 < D < 60	10		1.5
	Urban	SW	0	10 < D < 20	5		2.5
		DW	100	20 < D < 60	10		2.5
Laoag City	Rural	SW	0	10 < D < 20	5	2.0	
		DW	100	20 < D < 60	10	2.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Marcos	Rural	SW	0	10 < D < 20	5	1.5	
		DW	100	20 < D < 60	10	1.5	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Nueva Fra	Rural	SW	0	10 < D < 20	5	1.0	
		DW	10	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	40	20 < D < 60	10	2.5	

Table 7.6.3 Standard Specification of Wells by Municipality*

Municipality	Type	Type	Proportion** (%)	Standard Specification			Remarks
				Depth Range (m)	SWL (m)	Specific Capacity (l/sec/m)	
Pagudpud	Rural	SW	0	10 < D < 20	5	1.0	1 untapped spring with potential discharge of 1.28 l/sec
		DW	35	20 < D < 40	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.0	
		DW	100	20 < D < 40	10	2.0	
Paoyay	Rural	SW	0	10 < D < 20	5	2.0	
		DW	100	20 < D < 60	10	2.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Pasuquin	Rural	SW	0	10 < D < 20	5	1.5	
		DW	100	20 < D < 60	10	1.5	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Pidig	Rural	SW	0	10 < D < 20	5	1.5	1 untapped spring with potential discharge of 1.90 l/sec
		DW	100	20 < D < 60	10	1.5	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Pinili	Rural	SW	0	10 < D < 20	5	1.5	
		DW	100	20 < D < 60	10	1.5	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
San Nicolas	Rural	SW	0	10 < D < 20	5	2.0	
		DW	100	20 < D < 60	10	2.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Sarrat	Rural	SW	0	10 < D < 20	5	2.0	
		DW	100	20 < D < 60	10	2.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Solsona	Rural	SW	0	10 < D < 20	5	1.0	
		DW	30	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	
Vintar	Rural	SW	0	10 < D < 20	5	1.0	
		DW	80	20 < D < 60	10	1.0	
	Urban	SW	0	10 < D < 20	5	2.5	
		DW	100	20 < D < 60	10	2.5	

**B. FUTURE REQUIREMENTS AND
DEVELOPMENT PLAN**

8. FUTURE REQUIREMENTS IN WATER SUPPLY AND SANITATION IMPROVEMENT

8.2 Targets of Provincial Sector Plan

Table 8.2.1 Estimation of Base Year Service Coverage of Water Supply

Municipalities	Type	Population (1995)	Population Served by 1995 Facilities			Population Served by Planned/Ongoing Projects			Pop. Served in the Base Year (1995)					
			Level III	Level II	Level I	Level III	Level II	Level I	Level III	Level II	Level I			
			Total	Total	Total	Total	Total	Total	Total	Total	Total			
Adams	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	1,165	644	0	0	644	0	0	644	0	0	0	644	55
	Total	1,165	644	0	0	644	0	0	644	0	0	0	644	55
Bacurn	Urban	8,649	5,970	0	1,099	7,069	0	0	5,970	0	1,099	5,303	7,069	82
	Rural	20,318	4,667	1,080	5,053	10,800	0	450	4,667	1,080	5,053	11,250	11,250	55
	Total	28,967	10,637	1,080	6,152	17,869	0	450	10,637	1,080	6,602	18,319	18,319	63
Badoc	Urban	1,744	0	0	584	584	0	0	0	0	584	584	584	33
	Rural	25,798	0	1,952	8,621	10,573	0	0	1,952	8,621	10,573	10,573	41	
	Total	27,537	0	1,952	9,205	11,157	0	0	1,952	11,157	11,157	11,157	41	
Bangui	Urban	3,964	1,525	0	1,599	3,124	0	0	1,525	0	1,599	3,124	79	
	Rural	9,973	600	4,376	2,605	7,581	0	0	600	4,376	2,605	7,581	76	
	Total	13,937	2,125	4,376	4,204	10,705	0	0	2,125	4,376	4,204	10,705	77	
Batac	Urban	13,989	4,389	0	7,501	11,890	0	0	4,389	0	7,501	11,890	85	
	Rural	32,163	0	0	23,691	23,691	0	0	0	0	23,691	23,691	74	
	Total	46,152	4,389	0	31,192	35,581	0	0	4,389	0	31,192	35,581	77	
Burgos	Urban	1,459	505	0	634	1,139	0	0	505	0	634	1,139	78	
	Rural	7,265	936	0	3,102	4,038	0	0	936	0	3,102	4,038	56	
	Total	8,724	1,441	0	3,736	5,177	0	0	1,441	0	3,736	5,177	59	
Carnasi	Urban	0	0	0	0	0	0	0	0	0	0	0	0	
	Rural	774	0	602	110	712	0	0	602	110	712	712	92	
	Total	774	0	602	110	712	0	0	602	110	712	712	92	
Carrizao	Urban	1,068	926	0	81	1,007	0	0	926	0	81	1,007	94	
	Rural	9,367	996	0	3,793	4,789	0	0	996	0	3,793	4,789	51	
	Total	10,435	1,922	0	3,874	5,796	0	0	1,922	0	3,874	5,796	56	
Dangras	Urban	6,003	5,805	0	85	5,890	0	0	5,805	0	85	5,890	98	
	Rural	26,758	1,408	1,239	16,695	19,342	0	0	1,408	1,239	16,695	19,342	72	
	Total	32,761	7,213	1,239	16,780	25,232	0	0	7,213	1,239	16,780	25,232	77	
Dumalinog	Urban	0	0	0	0	0	0	0	0	0	0	0	0	
	Rural	971	828	0	0	828	0	0	828	0	0	828	85	
	Total	971	828	0	0	828	0	0	828	0	0	828	85	
Espirito	Urban	3,253	3,035	0	126	3,161	0	0	3,035	0	126	3,161	97	
	Rural	13,489	0	10,457	10,457	0	0	0	10,457	0	10,457	10,457	78	
	Total	16,742	3,035	10,583	13,618	0	0	0	3,035	0	10,583	13,618	81	
Laag City (Capital)	Urban	42,262	21,235	0	11,048	32,283	0	0	21,235	0	11,048	32,283	76	
	Rural	49,595	3,960	0	30,089	34,049	0	75	3,960	0	30,164	34,124	69	
	Total	91,857	25,195	0	41,137	66,332	0	75	25,195	0	41,212	66,407	72	
Maricos	Urban	1,497	0	0	972	972	0	0	0	0	972	972	65	
	Rural	13,087	0	540	8,710	9,250	0	255	540	0	8,965	9,505	73	
	Total	14,584	0	540	9,682	10,222	0	255	540	0	9,937	10,477	72	

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

Municipalities	Type	Population (1995)	Population Served by 1995 Facilities			Pop. Served by Planned/On-going Projects			Pop. Served in the Base Year (1995)			% Coverage		
			Level III	Level II	Level I	Level III	Level II	Level I	Level III	Level II	Level I		Total	
Nueva Ecija	Urban	1,416	0	870	104	974	0	0	0	870	104	974	69	
	Rural	4,644	0	1,670	634	2,304	0	30	30	1,670	664	2,334	50	
	Total	6,060	0	2,540	738	3,278	0	30	30	2,540	768	3,308	55	
Pagudpud	Urban	4,158	3,390	0	254	3,644	0	0	0	3,390	254	3,644	88	
	Rural	14,065	2,195	6,627	1,655	10,477	0	0	0	2,195	6,627	1,655	10,477	74
	Total	18,223	5,585	6,627	1,909	14,121	0	0	0	5,585	6,627	1,909	14,121	77
Paoay	Urban	7,230	1,210	0	3,185	4,595	0	0	0	1,210	0	3,185	4,395	61
	Rural	15,578	1,256	0	8,317	9,573	0	0	0	1,256	0	8,317	9,573	61
	Total	22,808	2,466	0	11,502	13,968	0	0	0	2,466	0	11,502	13,968	61
Passiguit	Urban	5,663	5,175	0	293	5,468	0	0	0	5,175	293	5,468	97	
	Rural	17,828	0	2,150	9,306	11,456	0	0	0	2,150	2,150	9,306	11,456	64
	Total	23,491	5,175	2,150	9,599	16,924	0	0	0	5,175	2,150	9,599	16,924	72
Piddig	Urban	3,238	0	0	2,460	2,460	0	0	0	0	0	2,460	2,460	76
	Rural	15,125	0	650	10,010	10,660	0	0	0	650	650	10,010	10,660	70
	Total	18,363	0	650	12,470	13,120	0	0	0	650	650	12,470	13,120	71
Pinitil	Urban	2,032	2,010	0	0	2,010	0	0	0	2,010	0	2,010	99	
	Rural	13,697	0	0	6,290	6,290	0	0	0	0	0	6,290	6,290	45
	Total	15,729	2,010	0	6,290	8,300	0	0	0	2,010	0	6,290	8,300	53
San Nicolas	Urban	20,168	17,356	558	1,762	19,676	0	0	0	17,356	558	1,762	19,676	98
	Rural	9,884	0	0	5,512	5,512	0	0	0	0	0	5,512	5,512	56
	Total	30,052	17,356	558	7,274	25,188	0	0	0	17,356	558	7,274	25,188	84
Sarrat	Urban	7,400	5,385	150	884	6,419	0	0	0	5,385	150	884	6,419	87
	Rural	15,229	0	475	8,002	8,477	0	0	0	475	8,002	8,477	56	
	Total	22,629	5,385	625	8,886	14,896	0	0	0	5,385	625	8,886	14,896	66
Solsona	Urban	3,361	0	0	2,930	2,930	0	0	0	0	0	2,930	2,930	87
	Rural	18,019	0	4,422	5,620	10,042	0	30	30	4,422	5,650	10,072	56	
	Total	21,380	0	4,422	8,550	12,972	0	30	30	4,422	8,580	13,002	61	
Vintar	Urban	4,662	2,310	0	1,330	3,640	0	0	0	2,310	0	1,330	3,640	78
	Rural	24,518	75	16,890	2,493	19,458	0	0	0	75	16,890	2,493	19,458	79
	Total	29,180	2,385	16,890	3,823	23,098	0	0	0	2,385	16,890	3,823	23,098	79
Provincial Total	Urban	143,216	80,226	1,578	36,931	118,735	0	0	0	80,226	1,578	36,931	118,735	83
	Rural	359,305	17,565	42,673	170,765	231,003	0	840	840	17,565	42,673	171,605	231,843	65
	Total	502,521	97,791	44,251	207,696	349,738	0	840	840	97,791	44,251	208,536	350,578	70

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

Municipalities	Type	Population Served by Existing Facilities				1995		2000	
		Level III	Level II	Level I	Total	Total Population	% Coverage	Total Population	% Coverage
Adamis	Urban	0	0	0	0	0	0	0	0
	Rural	644	0	0	644	1,165	55	1,236	52
	Total	644	0	0	644	1,165	55	1,236	52
Becarra	Urban	5,970	0	1,099	7,069	8,649	82	9,176	77
	Rural	4,667	1,080	5,503	11,250	20,318	55	21,556	52
	Total	10,637	1,080	6,602	18,319	28,967	63	30,732	60
Badoc	Urban	0	0	584	584	1,744	33	1,850	32
	Rural	0	1,952	8,621	10,573	25,793	41	27,365	39
	Total	0	1,952	9,205	11,157	27,537	41	29,215	38
Bangui	Urban	1,525	0	1,599	3,124	3,964	79	4,205	74
	Rural	600	4,376	2,605	7,581	9,973	76	10,581	72
	Total	2,125	4,376	4,204	10,705	13,937	77	14,786	72
Batac	Urban	4,389	0	7,501	11,890	13,989	85	14,811	80
	Rural	0	0	23,691	23,691	32,163	74	34,123	69
	Total	4,389	0	31,192	35,581	46,152	77	48,964	73
Burgos	Urban	505	0	634	1,139	1,459	78	1,548	74
	Rural	936	0	3,102	4,038	7,265	56	7,708	52
	Total	1,441	0	3,736	5,177	8,724	59	9,256	56
Carassi	Urban	0	0	0	0	0	0	0	0
	Rural	0	602	110	712	774	92	821	87
	Total	0	602	110	712	774	92	821	87
Cumimao	Urban	926	0	81	1,007	1,068	94	1,133	89
	Rural	996	0	3,793	4,789	9,367	51	9,938	48
	Total	1,922	0	3,874	5,796	10,435	56	11,071	52
Dingras	Urban	5,805	0	85	5,890	6,003	98	6,369	92
	Rural	1,408	1,239	16,695	19,342	26,758	72	28,388	68
	Total	7,213	1,239	16,780	25,232	32,761	77	34,757	73
Dumalneg	Urban	0	0	0	0	0	0	0	0
	Rural	828	0	0	828	971	85	1,030	80
	Total	828	0	0	828	971	85	1,030	80
Espiritu	Urban	3,035	0	126	3,161	3,253	97	3,451	92
	Rural	0	0	10,457	10,457	13,489	78	14,311	73
	Total	3,035	0	10,583	13,618	16,742	81	17,762	77
Laoag City (Capital)	Urban	21,235	0	11,048	32,283	42,262	76	44,838	72
	Rural	3,960	0	30,164	34,124	49,595	69	52,617	65
	Total	25,195	0	41,212	66,407	91,857	72	97,455	68

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

Municipalities	Type	Population Served by Existing Facilities				1995		2000	
		Level III	Level II	Level I	Total	Total Population	% Coverage	Total Population	% Coverage
Marcos	Urban	0	0	972	972	1,497	65	1,588	61
	Rural	0	540	8,965	9,505	13,087	73	13,885	68
	Total	0	540	9,937	10,477	14,584	72	15,473	68
Nueva Era	Urban	0	870	104	974	1,416	69	1,502	65
	Rural	0	1,670	664	2,334	4,644	50	4,927	47
	Total	0	2,540	768	3,308	6,060	55	6,429	51
Pagudpud	Urban	3,390	0	254	3,644	4,158	88	4,411	83
	Rural	2,195	6,627	1,655	10,477	14,065	74	14,922	70
	Total	5,585	6,627	1,909	14,121	18,223	77	19,333	73
Paoay	Urban	1,210	0	3,185	4,395	7,230	61	7,671	57
	Rural	1,256	0	8,317	9,573	15,578	61	16,527	58
	Total	2,466	0	11,502	13,968	22,808	61	24,198	58
Pasuquin	Urban	5,175	0	293	5,468	5,663	97	6,008	91
	Rural	0	2,150	9,306	11,456	17,828	64	18,914	61
	Total	5,175	2,150	9,599	16,924	23,491	72	24,922	68
Piddig	Urban	0	0	2,460	2,460	3,238	76	3,435	72
	Rural	0	650	10,010	10,660	15,125	70	16,047	66
	Total	0	650	12,470	13,120	18,363	71	19,482	67
Pinili	Urban	2,010	0	0	2,010	2,032	99	2,156	93
	Rural	0	0	6,290	6,290	13,697	46	14,531	43
	Total	2,010	0	6,290	8,300	15,729	53	16,687	50
San Nicolas	Urban	17,356	558	1,762	19,676	20,168	98	21,397	92
	Rural	0	0	5,512	5,512	9,884	56	10,486	53
	Total	17,356	558	7,274	25,188	30,052	84	31,883	79
Sarrat	Urban	5,385	150	884	6,419	7,400	87	7,851	82
	Rural	0	475	8,002	8,477	15,229	56	16,157	52
	Total	5,385	625	8,886	14,896	22,629	66	24,008	62
Solsona	Urban	0	0	2,930	2,930	3,361	87	3,566	82
	Rural	0	4,422	5,650	10,072	18,019	56	19,117	53
	Total	0	4,422	8,580	13,002	21,380	61	22,683	57
Vintar	Urban	2,310	0	1,330	3,640	4,662	78	4,946	74
	Rural	75	16,890	2,493	19,458	24,518	79	26,012	75
	Total	2,385	16,890	3,823	23,098	29,180	79	30,958	75
Provincial Total	Urban	80,226	1,578	36,931	118,735	143,216	83	151,942	78
	Rural	17,565	42,673	171,605	231,843	359,305	65	381,199	61
	Total	97,791	44,251	208,536	350,578	502,521	70	533,141	66

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

Municipality	Area	1995				Households Using Sanitary Toilets in 1995				Recipient Hts of Planned/Ongoing Projects				Households Using Sanitary Toilets in Base Year (1995)					
		Population	Hts	Flush	Pour Flush	VIP	Total	Flush	Pour Flush	VIP	Total	Number		Coverage (%)					
												Flush	Pour Flush	VIP	Total	Flush	Pour Flush	VIP	Total
Adams	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Rural	1,165	213	0	174	0	174	0	10	0	184	0	184	0	86	0	86		
	Total	1,165	213	0	174	0	174	0	10	0	184	0	184	0	86	0	86		
Bacarra	Urban	8,649	1,798	482	1,177	42	1,701	0	20	0	482	1,177	42	1,701	27	65	2	95	
	Rural	20,318	4,149	252	3,455	83	3,790	0	20	0	252	3,475	83	3,810	6	84	2	92	
	Total	28,967	5,947	734	4,632	125	5,491	0	20	0	734	4,652	125	5,511	12	78	2	93	
Badoc	Urban	1,744	358	50	283	0	333	0	0	0	50	283	0	333	14	79	0	93	
	Rural	25,793	5,098	120	4,729	0	4,849	0	11	0	11	120	4,740	0	4,860	2	93	0	95
	Total	27,537	5,456	170	5,012	0	5,182	0	11	0	11	170	5,023	0	5,193	3	92	0	95
Bangui	Urban	3,964	794	80	692	0	772	0	0	0	80	692	0	772	10	87	0	97	
	Rural	9,973	2,049	130	1,661	0	1,791	0	30	0	30	130	1,691	0	1,821	6	83	0	89
	Total	13,937	2,843	210	2,353	0	2,563	0	30	0	30	210	2,383	0	2,593	7	84	0	91
Batac	Urban	13,989	2,700	280	2,315	0	2,595	0	0	0	280	2,315	0	2,595	10	86	0	96	
	Rural	32,163	6,351	437	4,807	0	5,244	0	30	0	437	4,837	0	5,274	7	76	0	83	
	Total	46,152	9,051	717	7,122	0	7,839	0	30	0	717	7,152	0	7,869	8	79	0	87	
Burgos	Urban	1,459	285	15	235	0	250	0	0	0	15	235	0	250	5	82	0	88	
	Rural	7,265	1,390	27	943	0	970	0	10	0	27	953	0	980	2	69	0	71	
	Total	8,724	1,675	42	1,178	0	1,220	0	10	0	42	1,188	0	1,230	3	71	0	73	
Carassi	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rural	774	159	0	40	44	84	0	10	0	40	50	44	94	0	31	28	59	
	Total	774	159	0	40	44	84	0	10	0	40	50	44	94	0	31	28	59	
Curriniao	Urban	1,068	219	61	63	0	124	0	0	0	61	63	0	124	28	29	0	57	
	Rural	9,367	1,844	59	1,366	0	1,425	0	20	0	59	1,386	0	1,445	3	75	0	78	
	Total	10,435	2,063	120	1,429	0	1,549	0	20	0	120	1,449	0	1,569	6	70	0	76	
Dingras	Urban	6,003	1,179	114	1,046	0	1,160	0	0	0	114	1,046	0	1,160	10	89	0	98	
	Rural	26,758	5,199	81	5,068	0	5,149	0	20	0	81	5,088	0	5,169	2	98	0	99	
	Total	32,761	6,378	195	6,114	0	6,309	0	20	0	195	6,134	0	6,329	3	96	0	99	
Dumainej	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rural	971	183	0	183	0	183	0	0	0	183	0	183	0	100	0	100		
	Total	971	183	0	183	0	183	0	0	0	183	0	183	0	100	0	100		
Espintu	Urban	3,253	649	161	339	149	649	0	0	0	161	339	149	649	25	52	23	100	
	Rural	13,489	2,566	305	1,630	598	2,533	0	6	0	305	1,636	598	2,539	12	64	23	99	
	Total	16,742	3,215	466	1,969	747	3,182	0	6	0	466	1,975	747	3,188	14	61	23	99	
Laoag City (Capital)	Urban	42,262	8,540	2,100	6,302	0	8,402	0	0	0	2,100	6,302	0	8,402	25	74	0	98	
	Rural	49,595	9,956	663	8,330	0	8,993	0	74	0	663	8,404	0	9,067	7	84	0	91	
	Total	91,857	18,496	2,763	14,632	0	17,395	0	74	0	2,763	14,706	0	17,469	15	80	0	94	

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

Municipality	Area	1995				Households Using Sanitary Toilets in 1995				Recipient HHs. of Planned/Ongoing Projects				Households Using Sanitary Toilets in Base Year (1995)				
		Population	HHs	Flush	Pour Flush	Total	VIP	Flush	Pour Flush	Total	VIP	Flush	Pour Flush	Total	VIP	Flush	Pour Flush	Total
Marcos	Urban	1,497	291	9	282	0	0	0	291	0	0	0	0	291	0	0	0	291
	Rural	13,087	2,552	0	2,345	0	10	0	2,345	0	10	0	0	2,355	0	0	0	2,355
	Total	14,584	2,843	9	2,627	0	10	0	2,636	0	10	0	0	2,646	0	0	0	2,646
Nueva Era	Urban	1,416	266	4	184	0	0	0	188	0	0	0	0	188	0	0	0	188
	Rural	4,644	934	0	593	0	20	0	593	0	20	0	0	613	0	0	0	613
	Total	6,060	1,200	4	777	0	20	0	781	0	20	0	0	801	0	0	0	801
Pagudpud	Urban	4,158	806	27	702	0	0	0	729	0	0	0	0	729	0	0	0	729
	Rural	14,065	2,575	9	2,313	0	10	0	2,322	0	10	0	0	2,332	0	0	0	2,332
	Total	18,223	3,381	36	3,015	0	10	0	3,051	0	10	0	0	3,061	0	0	0	3,061
Paoy	Urban	7,230	1,419	356	1,048	15	0	0	1,419	15	0	0	0	1,448	15	0	0	1,448
	Rural	15,578	2,933	224	2,240	395	20	0	2,859	395	20	0	0	2,879	395	20	0	2,879
	Total	22,808	4,352	580	3,288	410	20	0	4,278	410	20	0	0	4,278	410	20	0	4,278
Pasuquin	Urban	5,663	1,184	270	724	0	0	0	994	0	0	0	0	994	0	0	0	994
	Rural	17,828	3,556	56	2,336	0	60	0	2,392	0	60	0	0	2,396	0	60	0	2,396
	Total	23,491	4,740	326	3,060	0	60	0	3,386	0	60	0	0	3,386	0	60	0	3,386
Piddig	Urban	3,238	646	30	613	0	0	0	643	0	0	0	0	643	0	0	0	643
	Rural	15,125	3,083	0	2,983	23	10	0	3,006	23	10	0	0	2,993	23	10	0	2,993
	Total	18,363	3,727	30	3,596	23	10	0	3,649	23	10	0	0	3,649	23	10	0	3,649
Pmili	Urban	2,032	387	14	371	0	0	0	385	0	0	0	0	385	0	0	0	385
	Rural	13,697	2,626	24	2,370	0	20	0	2,394	0	20	0	0	2,390	0	20	0	2,390
	Total	15,729	3,013	38	2,741	0	20	0	2,779	0	20	0	0	2,741	0	20	0	2,779
San Nicolas	Urban	20,168	4,089	583	3,500	0	0	0	4,083	0	0	0	0	4,083	0	0	0	4,083
	Rural	9,884	1,915	154	1,662	0	22	0	1,816	0	22	0	0	1,684	0	22	0	1,684
	Total	30,052	6,004	737	5,162	0	22	0	5,899	0	22	0	0	5,162	0	22	0	5,162
Sarrat	Urban	7,400	1,487	251	1,236	0	0	0	1,487	0	0	0	0	1,236	0	0	0	1,236
	Rural	15,229	3,160	0	3,116	0	10	0	3,116	0	10	0	0	3,126	0	10	0	3,126
	Total	22,629	4,647	251	4,352	0	10	0	4,603	0	10	0	0	4,352	0	10	0	4,352
Solsona	Urban	3,361	673	135	510	0	0	0	645	0	0	0	0	510	0	0	0	510
	Rural	18,019	3,539	160	3,206	0	30	0	3,366	0	30	0	0	3,226	0	30	0	3,226
	Total	21,380	4,212	295	3,716	0	30	0	4,011	0	30	0	0	3,386	0	30	0	3,386
Vintar	Urban	4,662	968	160	557	0	0	0	717	0	0	0	0	557	0	0	0	557
	Rural	24,518	4,929	85	3,275	0	31	0	3,360	0	31	0	0	3,306	0	31	0	3,306
	Total	29,180	5,897	245	3,832	0	31	0	4,077	0	31	0	0	3,832	0	31	0	3,832
Provincial Total	Urban	143,216	28,738	5,182	22,179	206	0	0	27,567	206	0	0	0	22,179	206	0	0	27,567
	Rural	359,305	70,957	2,786	58,825	1,143	474	0	62,754	1,143	474	0	0	59,299	1,143	474	0	63,228
	Total	502,521	99,695	7,968	81,004	1,349	474	0	90,321	1,349	474	0	0	81,478	1,349	474	0	90,795

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

Municipality	1995 Total No. of Public School Students	Std. No. of Students that can be Served by 1995 Toilets	No. of Students to be Served by Planned/On-going Projects	Std. No. of Students that can be Served by Toilets in Base Year (1995)	Coverage (%)
Adams	379	379	0	379	100
Bacarra	6,199	5,400	300	5,700	92
Badoc	3,906	3,906	150	4,056	104
Bangui	3,157	3,157	150	3,307	105
Batac	7,340	7,340	300	7,640	104
Burgos	2,136	2,136	150	2,286	107
Carassi	105	105	150	255	243
Currimaos	2,267	2,267	150	2,417	107
Dingras	4,724	4,724	150	4,874	103
Dumalneg	236	236	0	236	100
Espiritu	4,487	4,200	150	4,350	97
Laoag City (Capital)	15,404	7,700	0	7,700	50
Marcos	2,335	1,950	150	2,100	90
Nueva Era	1,390	1,000	150	1,150	83
Pagudpud	3,661	3,661	150	3,811	104
Paoay	2,436	2,436	150	2,586	106
Pasuquin	4,894	3,550	150	3,700	76
Piddig	2,992	2,992	150	3,142	105
Pinili	2,723	2,400	150	2,550	94
San Nicolas	5,616	5,616	150	5,766	103
Sarrat	3,035	3,035	150	3,185	105
Solsona	3,917	2,850	150	3,000	77
Vintar	3,805	2,300	300	2,600	68
Provincial Total	87,144	73,340	3,450	76,790	88

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

Municipality	Type	No. of PU in 1995	No. of PU with Sanitary Toilets in 1995	No. of PU in Planned/On-going Project	No. of PU with Sanitary Toilets in Planned/On-going Projects	No. of PU in Base Year 1995	No. of PU with Sanitary Toilets in Base year 1995	Coverage (%)
Adams	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Bacarra	Public Market	2	2	0	0	2	2	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	2	2	0	0	2	2	100
Badoc	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Bangui	Public Market	2	2	0	0	2	2	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	2	2	0	0	2	2	100
Barac	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Burgos	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	1	1	0	0	1	1	100
	Total	2	2	0	0	2	2	100
Carassi	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Curnimao	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Dingras	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Dumalneg	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Espinto	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Laog City (Capital)	Public Market	2	2	0	0	2	2	100
	Bus/Jeep Terminal	9	9	0	0	9	9	100
	Total	11	11	0	0	11	11	100

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

Municipality	Type	No. of PU in 1995	No. of PU with Sanitary Toilets in 1995	No. of PU in Planned/On-going Project	No. of PU with Sanitary Toilets in Planned/On-going Projects	No. of PU in Base Year 1995	No. of PU with Sanitary Toilets in Base year 1995	Coverage (%)
Maros	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Nueva Era	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Pagudpud	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Paoay	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Pasauquin	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Piddig	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Pimili	Public Market	2	2	0	0	2	2	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	2	2	0	0	2	2	100
San Nicolas	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	1	1	0	0	1	1	100
	Total	2	2	0	0	2	2	100
Sarrat	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Solsona	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Vintar	Public Market	1	1	0	0	1	1	100
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	1	0	0	1	1	100
Provincial Total	Public Market	27	27	0	0	27	27	100
	Bus/Jeep Terminal	11	11	0	0	11	11	100
	Total	38	38	0	0	38	38	100

Note: PU - Public Utilities

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

Municipality	Area	No. of Household Served by Existing Facilities						Coverage in 1995						Coverage in 2000					
		Flush	Pour Flush	VIP Latrine	Total	No. of HHs	Served Households			No. of HHs	Served Population			Flush	Pour Flush	VIP Latrine	Total		
							Flush	Pour Flush	VIP Latrine		Number	%	Number					%	
Adams	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rural	0	184	0	184	213	0	86	0	86	1,002	86	225	0	82	0	82		
	Total	0	184	0	184	213	0	86	0	86	1,002	86	225	0	82	0	82		
Bacarra	Urban	482	1,177	42	1,701	1,798	2	95	8,130	94	1,912	25	62	2	89	2	87		
	Rural	252	3,475	83	3,810	4,149	6	84	18,693	92	4,399	6	79	2	87	2	87		
	Total	734	4,652	125	5,511	5,947	12	78	26,823	92	6,311	12	74	2	87	2	87		
Badoc	Urban	50	283	0	333	338	14	79	1,622	93	378	13	75	0	88	0	88		
	Rural	120	4,740	0	4,860	5,098	2	93	24,503	95	5,366	2	88	0	91	0	91		
	Total	170	5,023	0	5,193	5,436	3	92	26,125	95	5,744	3	87	0	90	0	90		
Bangui	Urban	80	692	0	772	794	10	87	3,845	97	841	10	82	0	92	0	92		
	Rural	130	1,691	0	1,821	2,049	6	83	8,876	89	2,159	6	78	0	84	0	84		
	Total	210	2,383	0	2,593	2,843	7	84	12,721	91	3,000	7	79	0	86	0	86		
Batac	Urban	280	2,315	0	2,595	2,700	10	86	13,429	96	2,854	10	81	0	91	0	91		
	Rural	437	4,837	0	5,274	6,351	7	76	26,695	83	6,691	7	72	0	79	0	79		
	Total	717	7,152	0	7,869	9,051	8	79	40,124	87	9,545	8	75	0	82	0	82		
Burgos	Urban	15	235	0	250	285	5	82	1,269	87	304	5	77	0	82	0	82		
	Rural	27	933	0	960	1,390	2	69	5,138	71	1,482	2	64	0	66	0	66		
	Total	42	1,168	0	1,230	1,675	3	71	6,427	74	1,786	2	67	0	69	0	69		
Carassi	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Rural	0	50	44	94	159	0	31	457	59	168	0	30	26	56	0	56		
	Total	0	50	44	94	159	0	31	457	59	168	0	30	26	56	0	56		
Curniao	Urban	61	1,386	0	1,445	1,844	3	75	7,306	78	1,949	3	71	0	74	0	74		
	Rural	59	1,449	0	1,569	2,063	6	70	7,915	76	2,180	6	66	0	72	0	72		
	Total	120	2,835	0	3,014	3,907	9	72	15,221	77	4,129	9	68	0	73	0	73		
Dingras	Urban	114	1,046	0	1,160	1,179	10	89	5,943	99	1,249	9	84	0	93	0	93		
	Rural	81	5,088	0	5,169	5,199	2	98	26,758	100	5,566	1	91	0	93	0	93		
	Total	195	6,134	0	6,329	6,378	3	96	32,701	99	6,815	3	90	0	93	0	93		
Dumalneg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Rural	0	183	0	183	183	0	100	971	100	194	0	94	0	94	0	94		
	Total	0	183	0	183	183	0	100	971	100	194	0	94	0	94	0	94		
Espiritu	Urban	161	339	149	649	649	25	52	3,253	100	690	23	49	22	94	0	94		
	Rural	308	1,636	598	2,539	2,566	12	64	13,354	99	2,700	11	61	22	94	0	94		
	Total	466	1,975	747	3,188	3,215	14	61	16,607	98	3,390	14	58	22	94	0	94		
Laog City (Capital)	Urban	2,100	8,302	0	8,402	8,540	25	74	41,839	99	9,151	23	69	0	92	0	92		
	Rural	663	8,404	0	9,067	9,956	7	84	45,131	99	10,523	6	80	0	86	0	86		
	Total	2,763	14,706	0	17,469	18,496	15	80	86,970	95	19,674	14	75	0	89	0	89		

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

Municipality	No. of Household Served by Existing Facilities						Coverage in 1995						Coverage in 2000					
	Area	Flush	Pour Flush	VIP Latrine	Total	No. of HHs	Served Households			No. of HHs	Served Population			Served Households				
							Flush	Pour Flush	VIP Latrine		Total	Number	%	Flush	Pour Flush	VIP Latrine	%	
																		%
Marcos	Urban	9	282	0	291	291	3	97	0	100	1,497	100	311	3	91	0	94	
	Rural	0	2,355	0	2,355	2,355	0	92	0	92	12,040	92	2,723	0	86	0	86	
	Total	9	2,637	0	2,646	2,646	0	93	0	93	13,537	93	3,034	0	87	0	87	
Nueva Era	Urban	4	184	0	188	266	2	69	0	71	1,005	71	283	1	65	0	66	
	Rural	0	613	0	613	934	0	66	0	66	3,065	66	985	0	62	0	62	
	Total	4	797	0	801	1,200	0	66	0	67	4,070	66	1,268	0	63	0	63	
Pagudpud	Urban	27	702	0	729	806	3	87	0	90	3,742	90	848	3	83	0	86	
	Rural	9	2,323	0	2,332	2,575	0	91	0	91	12,659	90	2,713	0	86	0	86	
	Total	36	3,025	0	3,061	3,381	1	89	0	91	16,401	90	3,561	1	85	0	86	
Paoyay	Urban	356	1,048	15	1,419	1,419	25	74	1	100	7,230	100	1,504	24	70	1	94	
	Rural	224	2,560	395	2,879	2,933	8	77	13	98	15,266	98	3,118	7	72	13	92	
	Total	580	3,608	410	4,298	4,352	13	76	9	99	22,496	98	4,622	13	72	9	93	
Pasuquin	Urban	270	724	0	994	1,184	23	61	0	84	4,757	84	1,252	22	58	0	79	
	Rural	56	2,196	0	2,452	3,556	2	67	0	69	12,301	69	3,783	1	63	0	65	
	Total	326	3,120	0	3,446	4,740	7	66	0	73	17,058	73	5,035	6	62	0	68	
Pidig	Urban	30	613	0	643	646	5	95	0	100	3,238	100	687	4	89	0	94	
	Rural	0	2,993	23	3,016	3,081	0	97	1	98	14,823	98	3,275	0	91	1	92	
	Total	30	3,606	23	3,659	3,727	1	97	1	98	18,061	99	3,962	1	91	1	92	
Pinit	Urban	14	371	0	385	387	4	96	0	99	2,032	100	407	3	91	0	95	
	Rural	24	2,390	0	2,414	2,626	1	91	0	92	12,601	92	2,794	1	86	0	86	
	Total	38	2,761	0	2,799	3,013	1	92	0	93	14,633	93	3,201	1	86	0	87	
San Nicolas	Urban	583	3,500	0	4,083	4,089	14	86	0	100	20,168	100	4,367	13	80	0	93	
	Rural	154	1,684	0	1,838	1,915	8	88	0	96	9,489	96	2,017	8	83	0	91	
	Total	737	5,184	0	5,921	6,004	12	86	0	99	29,657	98	6,384	12	81	0	93	
Sarrat	Urban	251	1,236	0	1,487	1,487	17	83	0	100	7,400	100	1,570	16	79	0	95	
	Rural	0	3,126	0	3,126	3,160	0	99	0	99	15,077	99	3,366	0	93	0	93	
	Total	251	4,362	0	4,613	4,647	5	94	0	99	22,477	99	4,936	5	88	0	93	
Solsona	Urban	135	510	0	645	673	20	76	0	96	3,227	96	713	19	72	0	90	
	Rural	160	3,226	0	3,386	3,539	5	91	0	96	17,298	96	3,748	4	86	0	90	
	Total	295	3,736	0	4,031	4,212	7	89	0	96	20,525	96	4,461	7	84	0	90	
Vinar	Urban	160	557	0	717	968	17	58	0	74	3,497	75	1,030	16	54	0	70	
	Rural	85	3,306	0	3,391	4,929	2	67	0	69	16,917	69	5,202	2	64	0	65	
	Total	245	3,863	0	4,108	5,897	4	66	0	70	20,414	70	6,232	4	62	0	66	
Provincial Total	Urban	5,182	22,179	206	27,567	28,738	18	77	1	96	137,732	96	30,582	17	73	1	90	
	Rural	2,786	59,299	1,143	63,228	70,957	4	84	2	89	320,440	90	75,146	4	79	2	84	
	Total	7,968	81,478	1,349	90,795	99,695	8	82	1	91	458,172	91	105,728	8	77	1	86	

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

Municipality	Public Schools Toilets				Public Toilets				
	Std. No. of Students that can be Served by Base Year (1995)	Coverage in 1995		Coverage in 2000		Coverage in 1995		Coverage in 2000	
		Total No. of Public School Students	%	Total No. of Public School Students	%	No. of PU in Base Year	No. of PU with Sanitary Toilets in Base Year (1995)	No. of PU	No. of PU with Sanitary Toilets
Adams	379	100	383	99	1	1	2	1	
Bacarra	5,700	92	6,715	85	2	2	2	2	
Badoc	4,056	104	4,318	94	1	1	2	1	
Bangui	3,307	105	3,406	97	2	2	3	2	
Batac	7,640	104	8,064	95	1	1	3	1	
Burgos	2,286	107	2,312	99	2	2	4	2	
Carassi	255	243	116	220	1	1	2	1	
Currimao	2,417	107	2,460	98	1	1	2	1	
Dingras	4,874	103	5,167	94	1	1	3	1	
Dumalines	236	100	255	93	1	1	2	1	
Espiritu	4,350	97	4,880	89	1	1	1	1	
Laosag City (Capital)	7,700	50	16,714	46	11	11	13	11	
Marcos	2,100	90	2,548	82	1	1	2	1	
Nueva Era	1,150	83	1,503	77	1	1	2	1	
Pagudpud	3,811	104	4,016	95	1	1	3	1	
Paoay	2,586	106	2,682	96	1	1	1	1	
Pasauquin	3,700	76	5,318	70	1	1	2	1	
Piddig	3,142	105	3,248	97	1	1	2	1	
Pimili	2,550	94	2,982	86	2	2	2	2	
San Nicolas	5,766	103	6,149	94	2	2	3	2	
Sarrat	3,185	105	3,356	95	1	1	2	1	
Solskona	3,000	77	4,274	70	1	1	1	1	
Vintar	2,600	68	4,198	62	1	1	2	1	
Provincial Total	76,790	88	95,064	81	38	38	61	38	

Note: PU - Public Utilities

8.3 Projection of Frame Values

8.3.1 Review of Past Population Development and Population Projection

(I) Review of past population development

1) Characteristics of past population development

Major statistical data of past population development are shown in Table 8.3.1 in which urban and rural population are adjusted by PPDO to reflect present conditions. Provinces presently belonging to CAR are excluded from the regional population.

Table 8.3.1 Past Population Development

Area	Description	Total		Urban		Rural	
		1980	1990	1980	1990	1980	1990
Region I	Population	2,954,340	3,550,606	733,313	1,346,213	2,221,027	2,204,393
	Growth Rate	1.9%		6.3%		-0.1%	
Ilocos Norte	Population	390,666	461,661	117,406	134,863	273,260	326,798
	Growth Rate	1.7%		1.4%		1.8%	
	Percentage 1/	13.2%	13.0%	16.0%	10.0%	12.3%	14.8%

Note: 1/ Provincial population percentage to regional population

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

- The province recorded 1.7% of average annual growth rate which was almost equivalent to that of the region at 1.9%.
- Percentage of provincial population to the regional population slightly decreased from 13.2% in 1980 to 13.0% affected by urban population behavior.

The region is classified as an out-migration group in the country. However, higher growth rate of rural population in the province than that of the region revealed that the migration was brought from neighboring mountainous provinces. While, lower growth rate of urban population in the province compared to that of the region coincides with the conservative economic activities in the province as discussed in Chapter 3.

2) 1990 population distribution in urban and rural areas

The 1990 population census results conducted by NSO were reviewed in terms of population distribution to urban and rural areas. In application of revised classification of barangays in urban and rural category to reflect present conditions, the population by municipality was adjusted as shown in Table 8.3.2.

Table 8.3.2 Population Distribution in Urban and Rural Areas

Municipality	Total Population	1990 Census Data		Adjusted Population	
		Urban	Rural	Urban	Rural
Adams	1,119	1,119	0	0	1,119
Bacarra	26,940	8,428	18,512	8,428	18,512
Badoc	25,627	1,738	23,889	1,738	23,889
Bangui	12,921	3,805	9,116	3,805	9,116
Batac	43,092	12,859	30,233	12,859	30,233
Burgos	7,643	1,234	6,409	1,234	6,409
Carassi	632	0	632	0	632
Currímao	9,467	1,047	8,420	1,047	8,420
Dingras	30,519	5,805	24,714	5,805	24,714
Dumalneg	828	828	0	0	828
Espiritu	15,342	3,038	12,304	3,038	12,304
Laoag City (Capital)	83,756	38,875	44,881	38,875	44,881
Marcos	12,990	2,604	10,386	2,604	10,386
Nueva Era	5,238	1,151	4,087	1,151	4,087
Pagudpud	16,558	3,857	12,701	3,857	12,701
Paoay	20,680	1,175	19,505	6,724	13,956
Pasauquin	21,410	5,373	16,037	5,373	16,037
Piddig	17,078	3,063	14,015	3,063	14,015
Pinili	14,950	2,024	12,926	2,024	12,926
San Nicolas	27,632	18,781	8,851	18,781	8,851
Sarrat	21,272	6,940	14,332	6,940	14,332
Solsona	18,883	3,008	15,875	3,008	15,875
Vintar	27,084	4,509	22,575	4,509	22,575
Provincial Total	461,661	131,261	330,400	134,863	326,798

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

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

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

where, P_n : Population in n-th year

P_o : Population in the base year

r : Annual population growth rate

n : Growth period in year

Through the review of future regional population, it was learned that NSO projection coincides with the gradually declining annual growth rates; 1.39% from 1990 to 2000 and 1.10% from 2000 to 2010, while the last census decade from 1980 to 1990 recorded 1.96% (refer to Table 8.3.3). Thus, approximately 0.3% to 0.6% of the growth rate was discounted to every decade.

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

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

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

(3) Estimation of present population (1995)

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

(4) Projection of provincial population by target year

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

- Population in 2000 was projected from the base year 1995 applying the rate of 1.19% (29.1% discount to the growth rate of the province observed during the last census decade, 1980 to 1990).
- Population in 2010 with the base year of 2000 was projected applying the rate of 1.00% (although the rate of 0.94% was derived in application of 20.9% discount to the growth rate of the province adopted for the years 1996 to 2000, the rate of 1.00% was employed as the minimum growth rate for planning purpose).
- Present profile of population distribution both in urban and rural areas is assumed to prevail through the future.

- Household size in the year 2000 is assumed to be the same as the 1990 population census results, while that in the year 2010 was assumed to be 4 persons/household for the whole province in accordance with the target of the national family planning.

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

	Growth Rate (%)				Population and Provincial Share in the Region		
	1980 - 1990	1991 - 1995	1996 - 2000	2000 - 2010	1990	2000	2010
Region I	1.96	1.39 (29.1)		1.10 (20.9)	3,550,606	4,189,000	4,672,000
Ilocos Norte	1.68	1.68	1.19	1.00	461,661 13.0%	533,141 12.7%	588,919 12.6%

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

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

Table 8.3.4 Provincial Population for Target Years

Area	Population/Composition	1990	1995	2000	2010
Total	Population	461,661	502,521	533,141	588,919
Urban	Population	134,863	143,216	151,942	167,839
Area	Composition (%)	29	28	28	28
Rural	Population	326,798	359,305	381,199	421,080
Area	Composition (%)	71	72	72	72

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

Municipality	Number of Households														
	Household Size			1990			1995			2000			2010		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Adams	0.0	5.5	5.5	0	205	205	0	213	213	225	0	225	0	341	341
Bacarra	4.8	4.9	4.9	1,752	3,780	5,532	1,798	4,149	5,947	1,912	4,399	6,311	2,534	5,953	8,487
Badoc	4.9	5.1	5.0	357	4,722	5,079	358	5,098	5,456	378	5,366	5,744	511	7,557	8,068
Bangu	5.0	4.9	4.9	762	1,873	2,635	794	2,049	2,843	841	2,159	3,000	1,161	2,922	4,083
Batac	5.2	5.1	5.1	2,482	5,970	8,452	2,700	6,351	9,051	2,854	6,691	9,545	4,099	9,423	13,522
Burgos	5.1	5.2	5.2	241	1,226	1,467	285	1,390	1,675	304	1,482	1,786	428	2,129	2,557
Carassi	0.0	4.9	4.9	0	130	130	0	159	159	0	168	168	0	227	227
Curimaop	4.9	5.1	5.1	215	1,658	1,873	219	1,844	2,063	231	1,949	2,180	313	2,744	3,057
Dingras	5.1	5.1	5.1	1,140	4,802	5,942	1,179	5,199	6,378	1,249	5,566	6,815	1,759	7,840	9,599
Dumalinog	0.0	5.3	5.3	0	156	156	0	183	183	0	194	194	0	285	285
Espintu	5.0	5.3	5.2	606	2,341	2,947	649	2,566	3,215	690	2,700	3,390	953	3,952	4,905
Laoag City (Capital)	4.9	5.0	5.0	7,856	9,010	16,866	8,540	9,956	18,496	9,151	10,523	19,674	12,382	14,530	26,912
Marcos	5.1	5.1	5.1	262	2,270	2,532	291	2,552	2,843	311	2,723	3,034	439	3,835	4,274
Nueva Era	5.3	5.0	5.0	216	822	1,038	266	934	1,200	283	985	1,268	415	1,361	1,776
Pagudpud	5.2	5.5	5.4	748	2,325	3,073	806	2,575	3,381	848	2,713	3,561	1,218	4,121	5,339
Paoy	5.1	5.3	5.2	1,320	2,628	3,948	1,419	2,933	4,352	1,504	3,118	4,622	2,119	4,564	6,683
Pasquin	4.8	5.0	5.0	1,123	3,199	4,322	1,184	3,556	4,740	1,252	3,783	5,035	1,659	5,223	6,882
Piddig	5.0	4.9	4.9	611	2,855	3,466	646	3,081	3,727	687	3,275	3,962	949	4,432	5,381
Pinit	5.3	5.2	5.2	385	2,478	2,863	387	2,626	3,013	407	2,794	3,201	596	4,013	4,609
San Nicolas	4.9	5.2	5.0	3,808	1,715	5,523	4,089	1,915	6,004	4,367	2,017	6,384	5,909	2,896	8,805
Sarrat	5.0	4.8	4.9	1,395	2,974	4,369	1,487	3,160	4,647	1,570	3,366	4,936	2,168	4,462	6,630
Solsona	5.0	5.1	5.1	602	3,118	3,720	673	3,539	4,212	713	3,748	4,461	985	5,279	6,264
Vintar	4.8	5.0	4.9	936	4,538	5,474	968	4,929	5,897	1,030	5,202	6,232	1,366	7,184	8,550
Provincial Total	5.0	5.1	5.0	26,817	64,795	91,612	28,738	70,957	99,695	30,582	75,146	105,728	41,963	105,273	147,236

8.3.2 School Enrollment Projection

Table 8.3.6 Projected School Enrollment by Municipality by Target Year

Municipality	1995						2000						2010					
	School Age Population		Total Enrollment		Public School Enrollment		School Age Population		Total Enrollment		Public School Enrollment		School Age Population		Total Enrollment		Public School Enrollment	
	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate	Number	Participation Rate
Adams	344	110	379	110	365	383	105	383	105	387	379	98	379	98	379	98	379	98
Bacarra	7,275	93	6,199	85	7,718	7,332	95	6,715	87	8,188	7,942	97	7,287	89	7,287	97	7,287	89
Badoc	7,016	73	3,906	56	7,444	5,583	75	4,318	58	7,898	6,081	77	4,739	60	4,739	77	4,739	60
Bangui	3,528	92	3,157	89	3,743	3,518	94	3,406	91	3,971	3,812	96	3,693	93	3,693	96	3,693	93
Batac	10,706	87	7,340	69	11,358	10,109	89	8,064	71	12,050	10,966	91	8,797	73	8,797	91	8,797	73
Burgos	2,294	93	2,136	93	2,434	2,312	95	2,312	95	2,582	2,505	97	2,505	97	2,505	97	2,505	97
Carassi	185	57	105	57	196	116	59	116	59	208	127	61	127	61	127	61	127	61
Cumimao	2,415	94	2,267	94	2,562	2,460	96	2,460	96	2,718	2,664	98	2,664	98	2,664	98	2,664	98
Dingras	8,397	60	4,724	56	8,909	5,524	62	5,167	58	9,452	6,049	64	5,671	60	5,671	64	5,671	60
Dumalneg	253	93	236	93	268	255	95	255	95	284	275	97	275	97	275	97	275	97
Espirito	4,509	108	4,487	100	4,784	4,784	100	4,880	102	5,075	5,177	102	4,974	98	4,974	102	4,974	98
Laosig City (Capital)	22,189	87	15,404	69	23,541	20,951	89	16,714	71	24,976	22,728	91	18,232	73	18,232	91	18,232	73
Marcos	3,813	61	2,335	61	4,045	2,548	63	2,548	63	4,292	2,790	65	2,790	65	2,790	65	2,790	65
Nueva Era	1,592	87	1,390	87	1,689	1,503	89	1,503	89	1,792	1,631	91	1,631	91	1,631	91	1,631	91
Pagudpud	5,185	80	3,661	71	5,501	4,511	82	4,016	73	5,836	4,902	84	4,377	75	4,377	84	4,377	75
Pooy	5,496	51	2,436	44	5,831	3,090	53	2,682	46	6,186	3,402	55	2,969	48	2,969	55	2,969	48
Pasquian	5,897	86	4,894	83	6,256	5,505	88	5,318	85	6,637	5,973	90	5,774	87	5,774	90	5,774	87
Piddig	4,503	82	2,992	66	4,777	4,013	84	3,248	68	5,068	4,358	86	3,548	70	3,548	86	3,548	70
Pinili	3,799	80	2,723	72	4,030	3,305	82	2,982	74	4,275	3,591	84	3,249	76	3,249	84	3,249	76
San Nicolas	7,430	85	5,616	76	7,883	6,858	87	6,149	78	8,363	7,443	89	6,690	80	6,690	89	6,690	80
Sarrat	5,454	56	3,035	56	5,786	3,356	58	3,356	58	6,139	3,683	60	3,683	60	3,683	60	3,683	60
Sokona	5,519	79	3,917	71	5,855	4,743	81	4,274	73	6,212	5,156	83	4,659	75	4,659	83	4,659	75
Vintar	7,194	57	3,805	53	7,652	4,503	59	4,198	55	8,097	4,939	61	4,615	57	4,615	61	4,615	57
Provincial Total	124,993	79	87,144	70	132,607	107,262	81	95,064	72	140,686	116,573	83	103,528	73	103,528	83	103,528	73

8.3.3 Projection of the Number of Public Utilities

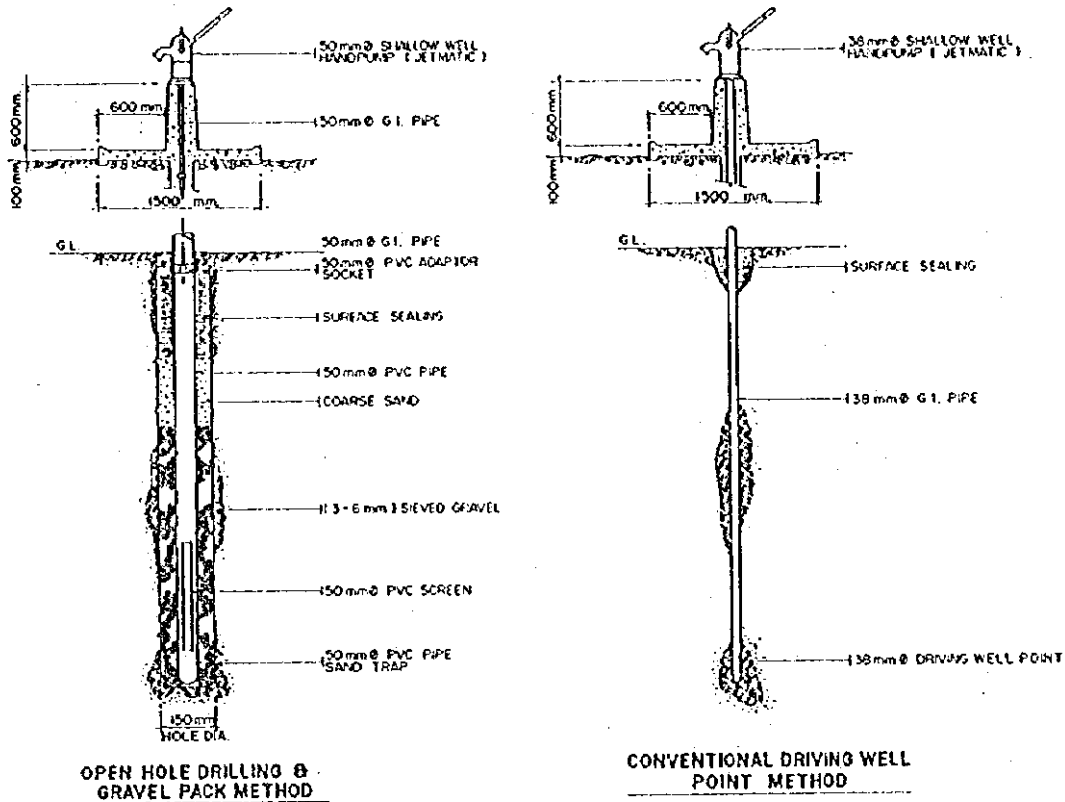
Table 8.3.7 Projected Number of Public Utilities by Municipality by Target Year

Municipality	Type	1995	2000		2010	
		No. of Public Utilities	Proposed Construction	Total	Proposed Construction	Total
Adams	Public Markets	1	1	2	0	2
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	1	2	1	3
Bacarra	Public Markets	2	0	2	0	2
	Bus/Jeep Term.	0	0	0	1	1
	Total	2	0	2	1	3
Badoc	Public Markets	1	1	2	1	3
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	1	2	2	4
Bangui	Public Markets	2	1	3	0	3
	Bus/Jeep Term.	0	0	0	1	1
	Total	2	1	3	1	4
Batac	Public Markets	1	1	2	1	3
	Bus/Jeep Term.	0	1	1	1	2
	Total	1	2	3	2	5
Burgos	Public Markets	1	1	2	1	3
	Bus/Jeep Term.	1	1	2	1	3
	Total	2	2	4	2	6
Carassi	Public Markets	1	1	2	0	2
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	1	2	1	3
Currimaog	Public Markets	1	1	2	1	3
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	1	2	2	4
Dingras	Public Markets	1	1	2	1	3
	Bus/Jeep Term.	0	1	1	1	2
	Total	1	2	3	2	5
Dumalneg	Public Markets	1	1	2	0	2
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	1	2	1	3
Espiritu	Public Markets	1	0	1	1	2
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	0	1	2	3
Laoag City (Capital)	Public Markets	2	1	3	1	4
	Bus/Jeep Term.	9	1	10	1	11
	Total	11	2	13	2	15

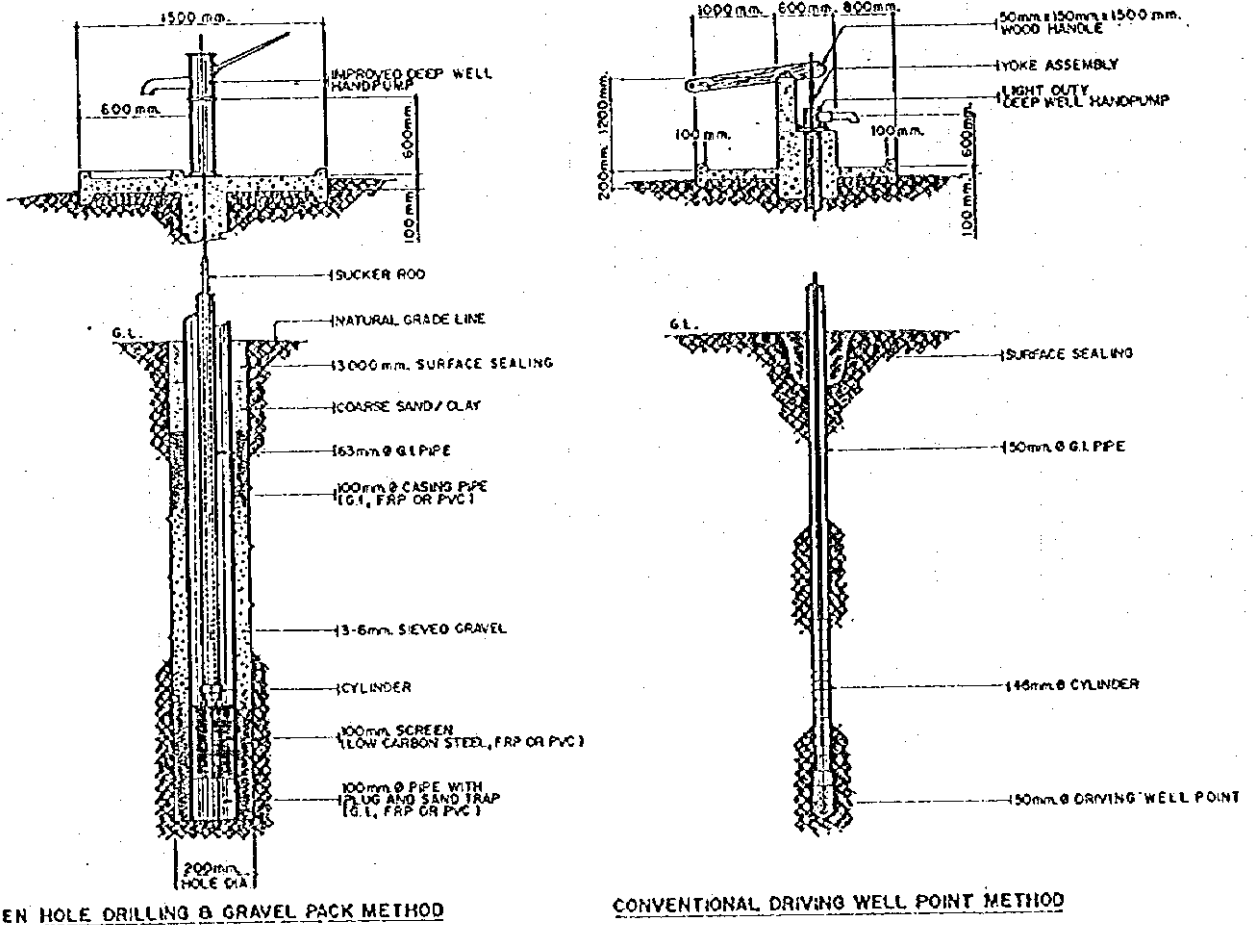
Table 8.3.7 Projected Number of Public Utilities by Municipality by Target Year (Cont'd.)

Municipality	Type	1995	2000		2010	
		No. of Public Utilities	Proposed Construction	Total	Proposed Construction	Total
Marcos	Public Markets	1	1	2	1	3
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	1	2	2	4
Nueva Era	Public Markets	1	1	2	0	2
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	1	2	1	3
Pagudpud	Public Markets	1	1	2	1	3
	Bus/Jeep Term.	0	1	1	1	2
	Total	1	2	3	2	5
Paoay	Public Markets	1	0	1	1	2
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	0	1	2	3
Pasuquin	Public Markets	1	1	2	1	3
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	1	2	2	4
Piddig	Public Markets	1	1	2	0	2
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	1	2	1	3
Pinili	Public Markets	2	0	2	0	2
	Bus/Jeep Term.	0	0	0	1	1
	Total	2	0	2	1	3
San Nicolas	Public Markets	1	1	2	0	2
	Bus/Jeep Term.	1	0	1	1	2
	Total	2	1	3	1	4
Sarrat	Public Markets	1	1	2	0	2
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	1	2	1	3
Solsona	Public Markets	1	0	1	1	2
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	0	1	2	3
Vintar	Public Markets	1	1	2	1	3
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	1	2	2	4
Provincial Total	Public Markets	27	18	45	13	58
	Bus/Jeep Term.	11	5	16	23	39
	Total	38	23	61	36	97

8.4 Types of Facilities and Implementation Criteria
 8.4.1 Water Supply



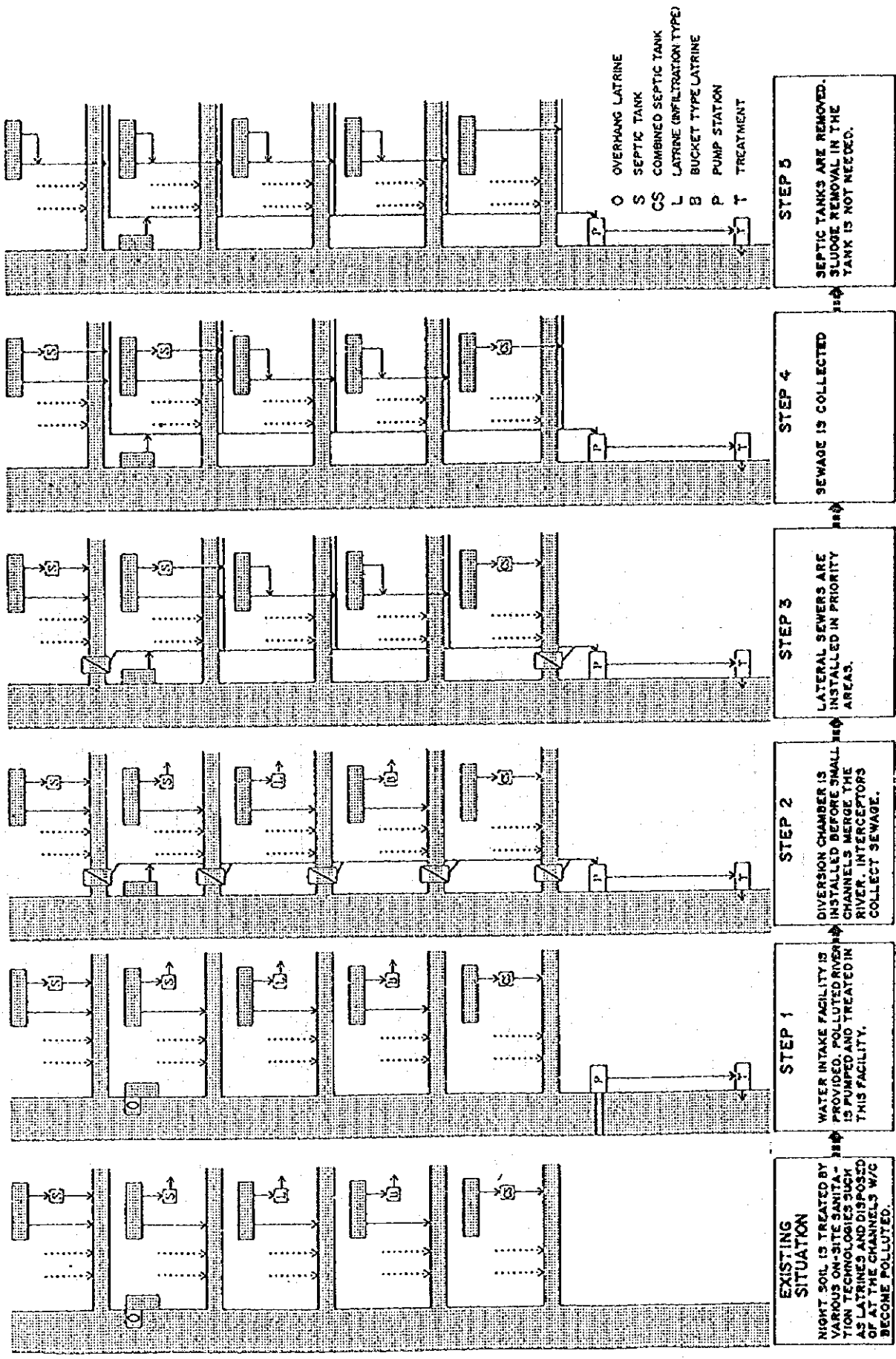
SHALLOW WELLS



DEEP WELLS

FIGURE 8.4.1
 STANDARD STRUCTURE OF LEVEL I WELLS

FIGURE 8.4.2 STAGED IMPROVEMENT IN SEWAGE COLLECTION METHOD



8.5 Service Coverage by Target Year

8.5.1 Water Supply

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

Three (3) untapped spring sources were confirmed to be suitable for Level II systems in rural water supply by the time of PW4SP preparation as shown in Table 8.5.1. Conditions and assumptions applied for this estimate are as follows:

Source capacity:

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

Number of system:

Three (3) untapped springs were considered to serve three (3) Level II systems in three (3) municipalities.

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

Municipality	Number of Untapped Spring	Number of Barangay to be Served	Number of Households to be Served	Population to be Served
Adams	0	0	0	0
Bacarra	0	0	0	0
Badoc	0	0	0	0
Bangui	0	0	0	0
Batac	0	0	0	0
Burgos	0	0	0	0
Carassi	0	0	0	0
Currimaos	0	0	0	0
Dingras	1	1	100	510
Dumalneg	0	0	0	0
Espiritu	0	0	0	0
Laoag City (Capital)	0	0	0	0
Marcos	0	0	0	0
Nueva Era	0	0	0	0
Pagudpud	1	1	100	550
Paoay	0	0	0	0
Pasuquin	0	0	0	0
Piddig	1	1	100	490
Pinili	0	0	0	0
San Nicolas	0	0	0	0
Sarrat	0	0	0	0
Solsona	0	0	0	0
Vintar	0	0	0	0
Provincial Total	3	3	300	1,550

(2) Population to be served by target year

Phase I

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

Phase II

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

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

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

Municipalities	Type	Population Served in the Base Year				Total Population	Service Coverage				Additional Population to be Served						
		Level III	Level II	Level I	Total		Total	Level III	Level II	Level I	Level III	Level II	Level I	Total			
															Level III	Level II	Level I
Adarna	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	644	0	0	644	1,236	644	0	0	345	0	0	0	345	0	0	345
	Total	644	0	0	644	1,236	644	0	0	345	0	0	0	345	0	0	345
Bacarra	Urban	5,970	0	1,099	7,069	9,176	7,800	6,701	0	1,099	0	0	0	5,995	0	0	731
	Rural	4,667	1,080	5,503	11,250	21,556	17,245	4,667	1,080	11,498	0	0	0	5,995	0	0	5,995
	Total	10,637	1,080	6,602	18,319	30,732	25,045	11,368	1,080	12,597	0	0	0	5,995	0	0	6,726
Badoc	Urban	0	0	584	584	1,850	1,573	989	0	584	0	0	0	989	0	0	989
	Rural	0	1,952	8,621	10,573	27,365	21,892	0	1,952	19,940	0	0	0	11,319	0	0	11,319
	Total	0	1,952	9,205	11,157	29,215	23,465	989	1,952	20,524	0	0	0	11,319	0	0	12,308
Bangu	Urban	1,525	0	1,599	3,124	4,205	3,574	1,975	0	1,599	0	0	0	884	0	0	450
	Rural	600	4,376	2,605	7,581	10,581	8,465	600	4,376	3,489	0	0	0	884	0	0	884
	Total	2,125	4,376	4,204	10,705	14,786	12,039	2,575	4,376	5,088	0	0	0	884	0	0	1,334
Batac	Urban	4,389	0	7,501	11,890	14,841	12,615	5,114	0	7,501	0	0	0	725	0	0	725
	Rural	0	0	23,691	23,691	34,123	27,298	0	0	27,298	0	0	0	3,607	0	0	3,607
	Total	4,389	0	31,192	35,581	48,964	39,913	5,114	0	34,799	0	0	0	3,607	0	0	4,332
Burgos	Urban	505	0	634	1,139	1,548	1,316	682	0	634	0	0	0	177	0	0	177
	Rural	936	0	3,102	4,038	7,708	6,166	936	0	5,230	0	0	0	2,128	0	0	2,128
	Total	1,441	0	3,736	5,177	9,256	7,482	1,618	0	5,864	0	0	0	2,128	0	0	2,305
Carassi	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	602	110	712	821	712	0	602	110	0	0	0	0	0	0	0
	Total	0	602	110	712	821	712	0	602	110	0	0	0	0	0	0	0
Currimaog	Urban	926	0	81	1,007	1,133	1,007	926	0	81	0	0	0	0	0	0	0
	Rural	996	0	3,793	4,789	9,938	7,950	996	0	6,954	0	0	0	3,161	0	0	3,161
	Total	1,922	0	3,874	5,796	11,071	8,957	1,922	0	7,035	0	0	0	3,161	0	0	3,161
Dingras	Urban	5,805	0	85	5,890	6,369	5,890	5,805	0	85	0	0	0	0	0	0	0
	Rural	1,408	1,239	16,695	19,342	28,388	22,710	1,408	1,239	19,553	0	0	0	2,858	0	0	2,858
	Total	7,213	1,239	16,780	25,232	34,757	28,600	7,213	1,239	19,638	0	0	0	2,858	0	0	3,368
Dumalinog	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	828	0	0	828	1,030	828	828	0	0	0	0	0	0	0	0	0
	Total	828	0	0	828	1,030	828	828	0	0	0	0	0	0	0	0	0
Espiritu	Urban	3,035	0	126	3,161	3,451	3,161	3,035	0	126	0	0	0	992	0	0	992
	Rural	0	0	10,457	10,457	14,311	11,449	0	0	11,449	0	0	0	992	0	0	992
	Total	3,035	0	10,583	13,618	17,762	14,610	3,035	0	11,575	0	0	0	992	0	0	992
Laong City (Capital)	Urban	21,235	0	11,048	32,283	44,838	38,112	27,064	0	11,048	0	0	0	5,829	0	0	5,829
	Rural	3,960	0	30,164	34,124	52,617	42,094	0	38,134	0	0	0	7,970	0	0	7,970	
	Total	25,195	0	41,212	66,407	97,455	80,206	31,024	0	49,182	0	0	0	13,799	0	0	13,799

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

Municipalities	Type	Population Served in the Base Year				Total Population	Service Coverage				Additional Population to be Served			
		Level III	Level II	Level I	Total		Total	Level III	Level II	Level I	Level III	Level II	Level I	Total
		0	0	972	972		1,588	1,350	378	0	972	378	0	0
Marcos	Urban	0	0	972	972	1,588	1,350	378	0	972	378	0	0	378
	Rural	0	540	8,963	9,503	13,885	11,108	0	540	10,568	0	0	1,603	1,603
	Total	0	540	9,937	10,477	15,473	12,458	378	540	11,540	378	0	1,603	1,981
Nueva Era	Urban	0	870	104	974	1,502	1,277	303	870	104	303	0	0	303
	Rural	0	1,670	664	2,334	4,927	3,942	0	1,670	2,272	0	0	1,608	1,608
	Total	0	2,540	768	3,308	6,429	5,219	303	2,540	2,376	303	0	1,608	1,911
Pagudpud	Urban	3,390	0	254	3,644	4,411	3,749	3,495	0	254	105	0	0	105
	Rural	2,195	6,627	1,655	10,477	14,922	11,938	2,195	7,177	2,566	0	550	911	1,461
	Total	5,585	6,627	1,909	14,121	19,333	15,687	5,690	7,177	2,820	105	550	911	1,566
Paoyay	Urban	1,210	0	3,185	4,395	7,671	6,520	3,335	0	3,185	2,125	0	0	2,125
	Rural	1,256	0	8,317	9,573	16,527	13,222	1,256	0	11,966	0	0	3,649	3,649
	Total	2,466	0	11,502	13,968	24,198	19,742	4,591	0	15,151	2,125	0	3,649	3,649
Pasuquin	Urban	5,175	0	293	5,468	6,008	5,468	5,175	0	293	0	0	0	0
	Rural	0	2,150	9,306	11,456	18,914	15,131	0	2,150	12,981	0	0	3,675	3,675
	Total	5,175	2,150	9,599	16,924	24,922	20,599	5,175	2,150	13,274	0	0	3,675	3,675
Piddig	Urban	0	0	2,460	2,460	3,435	2,920	460	0	2,460	460	0	0	460
	Rural	0	650	10,010	10,660	16,047	12,838	0	1,140	11,698	0	490	1,688	2,178
	Total	0	650	12,470	13,120	19,482	15,758	460	1,140	14,158	460	490	1,688	2,638
Pinit	Urban	2,010	0	0	2,010	2,156	2,010	2,010	0	0	0	0	0	0
	Rural	0	0	6,290	6,290	14,531	11,625	0	11,625	0	0	0	5,335	5,335
	Total	2,010	0	6,290	8,300	16,687	13,635	2,010	11,625	0	0	0	5,335	5,335
San Nicolas	Urban	17,356	558	1,762	19,676	21,397	19,676	17,356	558	1,762	0	0	2,877	2,877
	Rural	0	0	5,512	5,512	10,486	8,389	0	8,389	0	0	0	2,877	2,877
	Total	17,356	558	7,274	25,188	31,883	28,065	17,356	558	1,762	0	0	2,877	2,877
Sarrat	Urban	5,385	150	884	6,419	7,851	6,673	5,639	150	884	254	0	0	254
	Rural	0	475	8,002	8,477	16,157	12,926	0	475	12,451	0	0	4,449	4,449
	Total	5,385	625	8,886	14,896	24,008	19,599	5,639	625	13,335	254	0	4,449	4,703
Solsona	Urban	0	0	2,930	2,930	3,566	3,031	101	0	2,930	101	0	0	101
	Rural	0	4,422	5,650	10,072	19,117	15,294	0	4,422	10,872	0	0	5,222	5,222
	Total	0	4,422	8,580	13,002	22,683	18,325	101	4,422	13,802	101	0	5,222	5,323
Vintar	Urban	2,310	0	1,330	3,640	4,946	4,204	2,874	0	1,330	564	0	0	564
	Rural	75	16,890	2,493	19,458	26,012	20,810	75	16,890	3,845	0	0	1,352	1,352
	Total	2,385	16,890	3,823	23,098	30,958	25,014	2,949	16,890	5,175	564	0	1,352	1,916
Provincial Total	Urban	80,226	1,578	36,931	118,735	151,942	131,926	93,417	1,578	36,931	13,191	0	0	13,191
	Rural	17,565	42,673	171,605	231,843	381,199	305,021	17,565	44,223	243,233	0	1,550	71,628	73,178
	Total	97,791	44,251	208,536	350,578	533,141	436,947	110,982	45,801	280,164	13,191	1,550	71,628	86,369

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

Municipalities	Type	Population Served in 2000				Total Population	Phase II Coverage (2010)				Additional Population to be Served										
		Service Coverage					Total	Service Coverage				Total	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					
Adams	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
	Rural	644	0	345	989	1,365	1,297	644	653	0	653	0	0	0	0	0	0	0	0	308	
	Total	644	0	345	989	1,365	1,297	644	653	0	653	0	0	0	0	0	0	0	0	308	
Bacarra	Urban	6,701	0	1,099	7,800	10,136	9,629	9,629	0	0	0	0	0	0	0	0	0	0	0	0	2,928
	Rural	4,667	1,080	11,498	17,245	23,811	22,620	4,667	1,080	16,873	0	0	0	0	0	0	0	0	0	0	5,375
	Total	11,368	1,080	12,597	25,045	33,947	32,249	14,296	1,080	16,873	2,928	0	0	0	0	0	0	0	0	0	8,303
Badoc	Urban	989	0	584	1,573	2,044	1,942	1,942	0	953	0	0	0	0	0	0	0	0	0	0	953
	Rural	0	1,952	19,940	21,892	30,228	28,717	0	1,952	26,765	0	0	0	0	0	0	0	0	0	0	6,825
	Total	989	1,952	20,524	23,465	32,272	30,659	1,942	1,952	26,765	953	0	0	0	0	0	0	0	0	0	7,778
Bangui	Urban	1,975	0	1,599	3,574	4,645	4,413	4,413	0	0	0	0	0	0	0	0	0	0	0	0	2,438
	Rural	600	4,376	3,489	8,465	11,688	600	600	4,376	6,128	0	0	0	0	0	0	0	0	0	0	2,639
	Total	2,575	4,376	5,088	12,039	16,333	15,517	5,013	4,376	6,128	2,438	0	0	0	0	0	0	0	0	0	2,639
Batoc	Urban	5,114	0	7,501	12,615	16,394	15,574	15,574	0	0	0	0	0	0	0	0	0	0	0	0	10,460
	Rural	0	0	27,298	27,298	37,693	35,808	0	0	35,808	0	0	0	0	0	0	0	0	0	0	8,510
	Total	5,114	0	34,799	39,913	54,087	51,382	15,574	0	35,808	10,460	0	0	0	0	0	0	0	0	0	18,970
Burgos	Urban	682	0	634	1,316	1,710	1,625	1,625	0	943	0	0	0	0	0	0	0	0	0	0	943
	Rural	936	0	5,230	6,166	8,514	8,088	936	0	7,152	0	0	0	0	0	0	0	0	0	0	1,922
	Total	1,618	0	5,864	7,482	10,224	9,713	2,561	0	7,152	943	0	0	0	0	0	0	0	0	0	1,922
Carassi	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	602	110	712	907	862	862	0	602	260	0	0	0	0	0	0	0	0	0	150
	Total	0	602	110	712	907	862	862	0	602	260	0	0	0	0	0	0	0	0	0	150
Currimao	Urban	926	0	81	1,007	1,252	1,189	1,189	0	263	0	0	0	0	0	0	0	0	0	0	263
	Rural	996	0	6,984	7,980	10,977	10,428	996	0	9,432	0	0	0	0	0	0	0	0	0	0	2,478
	Total	1,922	0	7,065	8,987	12,229	11,617	2,185	0	9,432	263	0	0	0	0	0	0	0	0	0	2,741
Dingras	Urban	5,805	0	85	5,890	7,035	6,683	6,683	0	878	0	0	0	0	0	0	0	0	0	0	878
	Rural	1,408	1,749	19,553	22,710	31,358	29,790	1,408	1,749	26,633	0	0	0	0	0	0	0	0	0	0	7,080
	Total	7,213	1,749	19,638	28,600	38,393	36,473	8,091	1,749	26,633	878	0	0	0	0	0	0	0	0	0	7,958
Dumaling	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	828	0	828	1,656	1,138	1,081	828	0	253	0	0	0	0	0	0	0	0	0	0	253
	Total	828	0	828	1,656	1,138	1,081	828	0	253	0	0	0	0	0	0	0	0	0	0	253
Espiritu	Urban	3,035	0	126	3,161	3,812	3,621	3,621	0	586	0	0	0	0	0	0	0	0	0	0	586
	Rural	0	0	11,449	11,449	15,808	15,018	0	0	15,018	0	0	0	0	0	0	0	0	0	0	3,569
	Total	3,035	0	11,575	14,610	19,620	18,639	3,621	0	15,018	586	0	0	0	0	0	0	0	0	0	3,569
Laang City (Capital)	Urban	27,064	0	11,048	38,112	49,529	47,053	47,053	0	19,989	0	0	0	0	0	0	0	0	0	0	19,989
	Rural	3,960	0	38,134	42,094	58,121	55,215	3,960	0	51,255	0	0	0	0	0	0	0	0	0	0	13,121
	Total	31,024	0	49,182	80,206	107,650	102,268	51,013	0	51,255	19,989	0	0	0	0	0	0	0	0	0	13,121

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

Municipalities	Type	Population Served in 2000					Total Population	Service Coverage					Additional Population to be Served				
		Level III	Level II	Level I	Total	Total		Level III	Level II	Level I	Total	Level III	Level II	Level I	Total		
Marcos	Urban	378	0	972	1,350	1,754	1,666	0	1,288	0	0	0	1,288	0	0	0	1,288
	Rural	0	540	10,568	11,108	15,338	14,571	0	540	14,031	0	0	3,463	0	0	0	3,463
	Total	378	540	11,540	12,458	17,092	16,237	1,666	540	14,031	1,288	0	3,463	0	0	0	4,751
Nueva Era	Urban	303	870	104	1,277	1,659	1,576	0	1,273	0	0	0	1,273	0	0	0	1,273
	Rural	0	1,670	2,272	3,942	5,443	5,171	0	1,670	3,501	0	0	1,229	0	0	0	1,229
	Total	303	2,540	2,376	5,219	7,102	6,747	1,576	1,670	3,501	1,273	0	1,229	0	0	0	2,502
Pagudpod	Urban	3,495	0	254	3,749	4,873	4,629	0	1,134	0	0	0	1,134	0	0	0	1,134
	Rural	2,195	7,177	2,566	11,938	16,483	15,659	2,195	7,177	6,287	0	0	3,721	0	0	0	3,721
	Total	5,690	7,177	2,820	15,687	21,356	20,288	6,824	7,177	6,287	1,134	0	3,721	0	0	0	4,855
Paoy	Urban	3,335	0	3,185	6,520	8,474	8,050	0	4,715	0	0	0	4,715	0	0	0	4,715
	Rural	1,256	0	11,966	13,222	18,256	17,343	1,256	0	16,087	0	0	4,121	0	0	0	4,121
	Total	4,591	0	15,151	19,742	26,730	25,393	9,306	0	16,087	4,715	0	4,121	0	0	0	8,836
Pasquin	Urban	5,175	0	293	5,468	6,636	6,304	0	1,129	0	0	0	1,129	0	0	0	1,129
	Rural	0	2,150	12,981	15,131	20,893	19,848	0	2,150	17,698	0	0	4,717	0	0	0	4,717
	Total	5,175	2,150	13,274	20,599	27,529	26,152	6,304	2,150	17,698	1,129	0	4,717	0	0	0	5,846
Piddig	Urban	460	0	2,460	2,920	3,794	3,604	0	3,144	0	0	0	3,144	0	0	0	3,144
	Rural	0	1,140	11,698	12,838	17,726	16,840	0	1,140	15,700	0	0	4,002	0	0	0	4,002
	Total	460	1,140	14,158	15,758	21,520	20,444	3,604	1,140	15,700	3,144	0	4,002	0	0	0	7,146
Pinitir	Urban	2,010	0	0	2,010	2,382	2,263	0	253	0	0	0	253	0	0	0	253
	Rural	0	0	11,625	11,625	16,051	15,248	0	15,248	0	0	0	3,623	0	0	0	3,623
	Total	2,010	0	11,625	13,635	18,433	17,511	2,263	15,248	253	0	0	3,623	0	0	0	3,876
San Nicolas	Urban	17,356	558	1,762	19,676	23,636	22,454	0	5,098	0	0	0	5,098	0	0	0	5,098
	Rural	0	0	8,389	8,389	11,583	11,004	0	11,004	0	0	0	2,615	0	0	0	2,615
	Total	17,356	558	10,151	28,065	35,219	33,458	22,454	11,004	11,004	5,098	0	2,615	0	0	0	7,713
Sarrat	Urban	5,639	150	884	6,673	8,672	8,238	0	2,599	0	0	0	2,599	0	0	0	2,599
	Rural	0	475	12,451	12,926	17,848	16,956	0	475	16,481	0	0	4,030	0	0	0	4,030
	Total	5,639	625	13,335	19,599	26,520	25,194	8,238	475	16,481	2,599	0	4,030	0	0	0	6,629
Solsona	Urban	101	0	2,930	3,031	3,939	3,742	0	3,641	0	0	0	3,641	0	0	0	3,641
	Rural	0	4,422	10,872	15,294	21,117	20,061	0	4,422	15,639	0	0	4,767	0	0	0	4,767
	Total	101	4,422	13,802	18,325	25,056	23,803	3,742	4,422	15,639	3,641	0	4,767	0	0	0	8,408
Vintar	Urban	2,874	0	1,330	4,204	5,463	5,190	0	2,316	0	0	0	2,316	0	0	0	2,316
	Rural	75	16,890	3,845	20,810	28,734	27,297	75	16,890	10,332	0	0	6,487	0	0	0	6,487
	Total	2,949	16,890	5,175	25,014	34,197	32,487	5,265	16,890	10,332	2,316	0	6,487	0	0	0	8,803
Provincial Total	Urban	93,417	1,578	36,931	131,926	167,839	159,445	0	66,028	0	0	0	66,028	0	0	0	66,028
	Rural	17,565	44,223	245,233	305,021	421,080	400,026	17,565	44,223	338,238	0	0	95,005	0	0	0	95,005
	Total	110,982	45,801	280,164	436,947	588,919	559,471	177,010	44,223	338,238	66,028	0	95,005	0	0	0	161,033

8.5.2 Sanitation

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

Municipality	Area	No. of Households Served in the Base Year				No. of Households in 2000	Phase I Coverage (2000)											
		Flush	Pour Flush	VIP Latrine	Total		Household Coverage			Additional No. of Households to be Served								
							Flush	Pour Flush	VIP Latrine	Total	Flush	Pour Flush	VIP Latrine	Total				
Adams	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rural	0	184	0	184	225	22	194	0	216	22	10	0	0	0	32	0	0
	Total	0	184	0	184	225	22	194	0	216	22	10	0	0	0	32	0	0
Bacarra	Urban	482	1,177	42	1,701	1,912	482	1,354	0	1,836	0	177	0	0	177	0	0	0
	Rural	252	3,475	83	3,810	4,399	422	3,801	0	4,223	170	326	0	0	326	0	0	0
	Total	734	4,652	125	5,511	6,311	904	5,155	0	6,059	170	503	0	0	503	0	0	0
Badoc	Urban	50	283	0	333	378	91	272	0	363	41	0	0	0	41	0	0	0
	Rural	120	4,740	0	4,860	5,366	120	5,031	0	5,151	0	291	0	0	291	0	0	0
	Total	170	5,023	0	5,193	5,744	211	5,303	0	5,514	41	291	0	0	291	0	0	0
Bangun	Urban	80	692	0	772	841	202	605	0	807	122	0	0	0	122	0	0	0
	Rural	130	1,691	0	1,821	2,159	130	1,943	0	2,073	0	252	0	0	252	0	0	0
	Total	210	2,383	0	2,593	3,000	332	2,548	0	2,880	122	252	0	0	252	0	0	0
Batac	Urban	280	2,315	0	2,595	2,854	685	2,055	0	2,740	405	0	0	0	405	0	0	0
	Rural	437	4,837	0	5,274	6,691	437	5,986	0	6,423	0	1,149	0	0	1,149	0	0	0
	Total	717	7,152	0	7,869	9,545	1,122	8,041	0	9,163	405	1,149	0	0	1,149	0	0	0
Burgos	Urban	15	235	0	250	304	73	219	0	292	58	0	0	0	58	0	0	0
	Rural	27	953	0	980	1,482	142	1,281	0	1,423	115	328	0	0	328	0	0	0
	Total	42	1,188	0	1,230	1,786	215	1,500	0	1,715	173	328	0	0	328	0	0	0
Cavassi	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	50	44	94	168	0	161	0	161	0	111	0	0	111	0	0	0
	Total	0	50	44	94	168	0	161	0	161	0	111	0	0	111	0	0	0
Currimaog	Urban	61	63	0	124	231	61	63	0	124	0	0	0	0	0	0	0	0
	Rural	59	1,386	0	1,445	1,949	187	1,684	0	1,871	128	298	0	0	298	0	0	0
	Total	120	1,449	0	1,569	2,180	248	1,747	0	1,995	128	298	0	0	298	0	0	0
Dingras	Urban	114	1,046	0	1,160	1,249	300	899	0	1,199	186	0	0	0	186	0	0	0
	Rural	81	5,088	0	5,169	5,566	276	5,067	0	5,343	195	0	0	0	195	0	0	0
	Total	195	6,134	0	6,329	6,815	576	5,966	0	6,542	381	0	0	0	381	0	0	0
Dumalneg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	0	183	0	183	194	19	167	0	186	19	0	0	0	19	0	0	0
	Total	0	183	0	183	194	19	167	0	186	19	0	0	0	19	0	0	0
Espiritu	Urban	161	339	149	649	690	166	496	0	662	5	157	0	0	157	0	0	0
	Rural	305	1,636	598	2,539	2,700	305	2,287	0	2,592	0	651	0	0	651	0	0	0
	Total	466	1,975	747	3,188	3,390	471	2,783	0	3,254	5	808	0	0	808	0	0	0
Laoag City (Capital)	Urban	2,100	6,302	0	8,402	9,151	2,196	6,589	0	8,785	96	287	0	0	287	0	0	0
	Rural	663	8,404	0	9,067	10,523	792	9,310	0	10,102	129	906	0	0	906	0	0	0
	Total	2,763	14,706	0	17,469	19,674	2,988	15,899	0	18,887	225	1,193	0	0	1,193	0	0	0

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

Municipality	Area	No. of Households Served in the Base Year				No. of Households in 2000	Phase I Coverage (2000)							
		Flush	Pour Flush	VIP Latrine	Total		Household Coverage			Additional No. of Households to be Served				
							Flush	Pour Flush	VIP Latrine	Total	Flush	Pour Flush	VIP Latrine	Total
Marcos	Urban	9	282	0	291	311	74	225	0	299	65	0	0	65
	Rural	0	2,355	0	2,355	2,723	0	2,614	0	2,614	0	259	0	259
	Total	9	2,637	0	2,646	3,034	74	2,839	0	2,913	65	259	0	324
Nueva Era	Urban	4	184	0	188	283	57	215	0	272	53	31	0	84
	Rural	0	613	0	613	985	0	946	0	946	0	333	0	333
	Total	4	797	0	801	1,268	57	1,161	0	1,218	53	364	0	417
Pagudpud	Urban	27	702	0	729	848	204	610	0	814	177	0	0	177
	Rural	9	2,323	0	2,332	2,713	260	2,344	0	2,604	251	21	0	272
	Total	36	3,025	0	3,061	3,561	464	2,954	0	3,418	428	21	0	449
Paoyay	Urban	356	1,048	15	1,419	1,504	361	1,083	0	1,444	5	35	0	40
	Rural	224	2,260	395	2,879	3,118	237	2,756	0	2,993	13	496	0	509
	Total	580	3,308	410	4,298	4,622	598	3,839	0	4,437	18	531	0	549
Pasauqun	Urban	270	724	0	994	1,252	300	902	0	1,202	30	178	0	208
	Rural	56	2,396	0	2,452	3,783	56	3,576	0	3,632	0	1,180	0	1,180
	Total	326	3,120	0	3,446	5,035	356	4,478	0	4,834	30	1,358	0	1,388
Piddig	Urban	30	613	0	643	687	92	568	0	660	62	0	0	62
	Rural	0	2,993	23	3,016	3,275	0	3,144	0	3,144	0	151	0	151
	Total	30	3,606	23	3,659	3,962	92	3,712	0	3,804	62	151	0	213
Pintli	Urban	14	371	0	385	407	98	293	0	391	84	0	0	84
	Rural	24	2,390	0	2,414	2,794	24	2,658	0	2,682	0	268	0	268
	Total	38	2,761	0	2,799	3,201	122	2,951	0	3,073	84	268	0	352
San Nicolas	Urban	583	3,500	0	4,083	4,367	1,048	3,144	0	4,192	465	0	0	465
	Rural	154	1,684	0	1,838	2,017	154	1,782	0	1,936	0	98	0	98
	Total	737	5,184	0	5,921	6,384	1,202	4,926	0	6,128	465	98	0	563
Sarrat	Urban	251	1,236	0	1,487	1,570	377	1,130	0	1,507	126	0	0	126
	Rural	0	3,126	0	3,126	3,366	0	3,231	0	3,231	0	105	0	105
	Total	251	4,362	0	4,613	4,936	377	4,361	0	4,738	126	105	0	231
Solsona	Urban	135	510	0	645	713	135	549	0	684	0	39	0	39
	Rural	160	3,226	0	3,386	3,748	160	3,438	0	3,598	0	212	0	212
	Total	295	3,736	0	4,031	4,461	295	3,987	0	4,252	0	251	0	251
Vintar	Urban	160	557	0	717	1,030	247	742	0	989	87	185	0	272
	Rural	85	3,306	0	3,391	5,202	85	4,909	0	4,994	0	1,603	0	1,603
	Total	245	3,863	0	4,108	6,232	332	5,651	0	5,983	87	1,788	0	1,875
Provincial Total	Urban	5,182	22,179	206	26,888	30,582	7,259	22,013	0	29,262	2,067	1,089	0	3,156
	Rural	2,786	59,299	1,143	63,228	75,146	3,828	68,310	0	72,138	1,042	9,048	0	10,090
	Total	7,968	81,478	1,349	90,066	105,728	11,077	90,323	0	101,400	3,109	10,137	0	13,246

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

Municipality	Area	No. of Households Served in 2000				No. of Households in 2010	Phase II Coverage (2010)				Add'l No. of Households to be Served						
		Flush	Four Flush	VIP Latrine	Total		Households Coverage		Total	Flush	Pour Flush	VIP Flush	Total	Flush	Pour Flush	VIP Flush	Total
							Flush	Pour Flush									
Adams	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Rural	22	194	0	216	341	67	267	0	334	45	73	0	118			
	Total	22	194	0	216	341	67	267	0	334	45	73	0	118			
Bacarra	Urban	482	1,354	0	1,836	2,534	1,242	1,241	0	2,483	760	0	0	760			
	Rural	422	3,801	0	4,223	5,953	1,167	4,667	0	5,834	745	866	0	1,611			
	Total	904	5,155	0	6,059	8,487	2,409	5,908	0	8,317	1,505	866	0	2,371			
Badoc	Urban	91	272	0	363	511	250	251	0	501	159	0	0	159			
	Rural	120	5,031	0	5,151	7,557	120	7,286	0	7,406	0	2,255	0	2,255			
	Total	211	5,303	0	5,514	8,068	370	7,537	0	7,907	159	2,255	0	2,414			
Bangui	Urban	202	605	0	807	1,161	569	569	0	1,138	367	0	0	367			
	Rural	130	1,943	0	2,073	2,922	150	2,714	0	2,864	20	771	0	791			
	Total	332	2,548	0	2,880	4,083	719	3,283	0	4,002	387	771	0	1,158			
Batac	Urban	685	2,055	0	2,740	4,099	2,009	2,008	0	4,017	1,324	0	0	1,324			
	Rural	437	5,986	0	6,423	9,423	437	8,798	0	9,235	0	2,812	0	2,812			
	Total	1,122	8,041	0	9,163	13,522	2,446	10,806	0	13,252	1,324	2,812	0	4,136			
Burgos	Urban	73	219	0	292	428	210	209	0	419	137	0	0	137			
	Rural	142	1,281	0	1,423	2,159	234	1,852	0	2,086	92	571	0	663			
	Total	215	1,500	0	1,715	2,587	444	2,061	0	2,505	229	571	0	800			
Carassi	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Rural	0	161	0	161	227	0	222	0	222	0	61	0	61			
	Total	0	161	0	161	227	0	222	0	222	0	61	0	61			
Currmao	Urban	61	63	0	124	313	153	154	0	307	92	91	0	183			
	Rural	187	1,684	0	1,871	2,744	249	2,440	0	2,689	62	756	0	818			
	Total	248	1,747	0	1,995	3,057	402	2,594	0	2,996	154	847	0	1,001			
Dingras	Urban	300	899	0	1,199	1,759	862	862	0	1,724	562	0	0	562			
	Rural	276	5,067	0	5,343	7,840	352	7,331	0	7,683	76	2,264	0	2,340			
	Total	576	5,966	0	6,542	9,599	1,214	8,193	0	9,407	638	2,264	0	2,902			
Dumalneg	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Rural	19	167	0	186	285	56	223	0	279	37	56	0	93			
	Total	19	167	0	186	285	56	223	0	279	37	56	0	93			
Espiritu	Urban	166	496	0	662	953	467	467	0	934	301	0	0	301			
	Rural	305	2,287	0	2,592	3,952	305	3,568	0	3,873	0	1,281	0	1,281			
	Total	471	2,783	0	3,254	4,905	772	4,035	0	4,807	301	1,281	0	1,582			
Laoag City (Capital)	Urban	2,196	6,589	0	8,785	12,382	6,067	6,067	0	12,134	3,871	0	0	3,871			
	Rural	792	9,310	0	10,102	14,530	990	13,249	0	14,239	198	3,939	0	4,137			
	Total	2,988	15,899	0	18,887	26,912	7,057	19,316	0	26,373	4,069	3,939	0	8,008			

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

Municipality	Area	No. of Households Served in 2009				No. of Households in 2010	Phase II Coverage (2010)				Add'l No. of Households to be Served			
		Flush	Pour Flush	VIP Latrine	Total		Households Coverage		Total		Flush	Pour Flush	VIP Flush	Total
							Flush	Pour Flush	Flush	Pour Flush				
Marcos	Urban	74	225	0	299	439	215	0	430	141	0	0	141	
	Rural	0	2,614	0	2,614	3,835	0	3,758	0	1,144	0	0	1,144	
	Total	74	2,839	0	2,913	4,274	215	3,973	0	4,188	141	1,144	0	1,285
Nueva Era	Urban	57	215	0	272	415	203	204	0	407	146	0	146	
	Rural	0	946	0	946	1,361	0	1,334	0	388	0	0	388	
	Total	57	1,161	0	1,218	1,776	203	1,538	0	1,741	146	388	0	534
Pagudpud	Urban	204	610	0	814	1,218	597	597	0	1,194	393	0	393	
	Rural	260	2,344	0	2,604	4,121	549	3,490	0	4,039	289	1,146	0	1,435
	Total	464	2,954	0	3,418	5,339	1,146	4,087	0	5,233	682	1,146	0	1,828
Paoy	Urban	361	1,083	0	1,444	2,119	1,038	1,039	0	2,077	677	0	677	
	Rural	237	2,756	0	2,993	4,564	314	4,159	0	4,473	77	1,403	0	1,480
	Total	598	3,839	0	4,437	6,683	1,352	5,198	0	6,550	754	1,403	0	2,157
Pasuquin	Urban	300	902	0	1,202	1,659	813	813	0	1,626	513	0	513	
	Rural	56	3,576	0	3,632	5,223	56	5,063	0	5,119	0	1,487	0	1,487
	Total	356	4,478	0	4,834	6,882	869	5,876	0	6,745	513	1,487	0	2,000
Piddig	Urban	92	568	0	660	949	465	465	0	930	373	0	373	
	Rural	0	3,144	0	3,144	4,432	0	4,343	0	4,343	0	1,199	0	1,199
	Total	92	3,712	0	3,804	5,381	465	4,808	0	5,273	373	1,199	0	1,572
Pmili	Urban	98	293	0	391	596	292	292	0	584	194	0	194	
	Rural	24	2,658	0	2,682	4,013	24	3,909	0	3,933	0	1,251	0	1,251
	Total	122	2,951	0	3,073	4,609	316	4,201	0	4,517	194	1,251	0	1,445
San Nicolas	Urban	1,048	3,144	0	4,192	5,909	2,895	2,896	0	5,791	1,847	0	1,847	
	Rural	154	1,782	0	1,936	2,896	154	2,684	0	2,838	0	902	0	902
	Total	1,202	4,926	0	6,128	8,805	3,049	5,580	0	8,629	1,847	902	0	2,749
Sarrat	Urban	377	1,130	0	1,507	2,168	1,062	1,063	0	2,125	685	0	685	
	Rural	0	3,231	0	3,231	4,462	0	4,373	0	4,373	0	1,142	0	1,142
	Total	377	4,361	0	4,738	6,630	1,062	5,436	0	6,498	685	1,142	0	1,827
Solsona	Urban	135	549	0	684	985	483	482	0	965	348	0	348	
	Rural	160	3,438	0	3,598	5,279	160	5,013	0	5,173	0	1,575	0	1,575
	Total	295	3,987	0	4,282	6,264	643	5,495	0	6,138	348	1,575	0	1,923
Vintar	Urban	247	742	0	989	1,366	669	670	0	1,339	422	0	422	
	Rural	85	4,909	0	4,994	7,184	85	6,955	0	7,040	0	2,046	0	2,046
	Total	332	5,651	0	5,983	8,550	754	7,625	0	8,379	422	2,046	0	2,468
Provincial Total	Urban	7,249	22,013	0	29,262	41,963	20,561	20,564	0	41,125	13,312	91	0	13,403
	Rural	3,828	68,310	0	72,138	105,273	5,469	97,698	0	103,167	1,641	29,388	0	31,029
	Total	11,077	90,323	0	101,400	147,236	26,030	118,262	0	144,292	14,953	29,479	0	44,432

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

Municipality	Std. No. of Public School Student that can be Served in the Base Year	Projected No. of Public School Students in 2000	Phase I Coverage (2000)		Std. No. of Public School Students that can be Served in 2000	Projected No. of Public School Students in 2010	Phase II Coverage (2010)	
			Public School Students Coverage	Add'l No. of Public School Students to be Served			Public School Students Coverage	Add'l No. of Public School Students to be Served
Adams	379	383	345	0	345	379	360	15
Bacarra	5,700	6,715	6,044	344	6,044	7,287	6,923	879
Bacod	4,056	4,318	3,886	0	3,886	4,739	4,502	616
Bangui	3,307	3,406	3,065	0	3,065	3,693	3,508	443
Batac	7,640	8,064	7,258	0	7,258	8,797	8,357	1,099
Burgos	2,286	2,312	2,081	0	2,081	2,505	2,380	299
Carassi	255	116	104	0	104	127	121	17
Currimao	2,417	2,460	2,214	0	2,214	2,664	2,531	317
Dingras	4,874	5,167	4,650	0	4,650	5,671	5,387	737
Dumalneg	236	255	230	0	230	275	261	31
Espiritu	4,350	4,880	4,392	42	4,392	4,974	4,725	333
Laang City (Capital)	7,700	16,714	15,043	7,343	15,043	18,232	17,320	2,277
Marcos	2,100	2,548	2,293	193	2,293	2,790	2,651	358
Nueva Era	1,150	1,503	1,353	203	1,353	1,631	1,549	196
Pagudpud	3,811	4,016	3,614	0	3,614	4,377	4,158	544
Paoy	2,586	2,682	2,414	0	2,414	2,969	2,821	407
Pasquin	3,700	5,318	4,786	1,086	4,786	5,774	5,485	699
Piddig	3,142	3,248	2,923	0	2,923	3,548	3,371	448
Pinitii	2,550	2,982	2,684	134	2,684	3,249	3,087	403
San Nicolas	5,766	6,149	5,534	0	5,534	6,690	6,356	822
Sarrat	3,185	3,356	3,020	0	3,020	3,683	3,499	479
Solsotia	3,000	4,274	3,847	847	3,847	4,659	4,426	579
Vintar	2,600	4,198	3,778	1,178	3,778	4,615	4,384	606
Provincial Total	76,790	95,064	85,558	11,370	85,558	103,328	98,162	12,604

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

Municipality	Type	Coverage in 1995		Phase I Coverage (2000)			No. of PU with Sanitary Toilets in 2000	Phase II Coverage (2010)		
		No. of PU	No. of PU with Sanitary Toilet	No. of PU	Add'l No. of Public Utilities with Sanitary Toilet	No. of PU with Sanitary Toilet		No. of PU	Add'l No. of Public Utilities with Sanitary Toilet	No. of PU with Sanitary Toilet
Adams	Public Market	1	1	2	1	2	2	2	0	2
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	2	1	2	2	3	1	3
Bacarra	Public Market	2	2	2	0	2	2	2	0	2
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	2	2	2	0	2	2	3	1	3
Bodoc	Public Market	1	1	2	1	2	2	3	1	3
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	2	1	2	2	4	2	4
Bongoi	Public Market	2	2	3	1	3	3	3	0	3
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	2	2	3	1	3	3	4	1	4
Botac	Public Market	1	1	2	1	2	2	3	1	3
	Bus/Jeep Term.	0	0	1	1	1	1	2	1	2
	Total	1	1	3	2	3	3	5	2	5
Burgos	Public Market	1	1	2	1	2	2	3	1	3
	Bus/Jeep Term.	1	1	2	1	2	2	3	1	3
	Total	2	2	4	2	4	4	6	2	6
Carassi	Public Market	1	1	2	1	2	2	2	0	2
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	2	1	2	2	3	1	3
Curimaao	Public Market	1	1	2	1	2	2	3	1	3
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	2	1	2	2	4	2	4
Dingras	Public Market	1	1	2	1	2	2	3	1	3
	Bus/Jeep Term.	0	0	1	1	1	1	2	1	2
	Total	1	1	3	2	3	3	5	2	5
Dumalneg	Public Market	1	1	2	1	2	2	2	0	2
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	2	1	2	2	3	1	3
Espirito	Public Market	1	1	1	0	1	1	2	1	2
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	1	0	1	1	3	2	3
Laoag City (Capital)	Public Market	2	2	3	1	3	3	4	1	4
	Bus/Jeep Term.	9	9	10	1	10	10	11	1	11
	Total	11	11	13	2	13	13	15	2	15

Table 8.5.7 Number of Public Utilities with Sanitary Toilets in Phases I and II (Cont'd.)

Municipality	Type	Coverage in 1995		Phase I Coverage (2000)			No. of PU with Sanitary Toilets in 2000	Phase II Coverage (2010)		
		No. of PU	No. of PU with Sanitary Toilet	No. of PU	Add'l No. of Public Utilities with Sanitary Toilet	No. of PU with Sanitary Toilet		No. of PU	Add'l No. of Public Utilities with Sanitary Toilet	No. of PU with Sanitary Toilet
Marcos	Public Market	1	1	2	1	2	2	3	1	3
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	2	1	2	2	4	2	4
Nueva Era	Public Market	1	1	2	1	2	2	2	0	2
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	2	1	2	2	3	1	3
Pagudpud	Public Market	1	1	2	1	2	2	3	1	3
	Bus/Jeep Term.	0	0	1	1	1	1	2	1	2
	Total	1	1	3	2	3	3	5	2	5
Paoy	Public Market	1	1	1	0	1	1	2	1	2
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	1	0	1	1	3	2	3
Pasuquin	Public Market	1	1	2	1	2	2	3	1	3
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	2	1	2	2	4	2	4
Piddig	Public Market	1	1	2	1	2	2	2	0	2
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	2	1	2	2	3	1	3
Pinili	Public Market	2	2	2	0	2	2	2	0	2
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	2	2	2	0	2	2	3	1	3
San Nicolas	Public Market	1	1	2	1	2	2	2	0	2
	Bus/Jeep Term.	1	1	1	0	1	1	2	1	2
	Total	2	2	3	1	3	3	4	1	4
Sarrat	Public Market	1	1	2	1	2	2	2	0	2
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	2	1	2	2	3	1	3
Solsona	Public Market	1	1	1	0	1	1	2	1	2
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	1	0	1	1	3	2	3
Vintar	Public Market	1	1	2	1	2	2	3	1	3
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	1	2	1	2	2	4	2	4
Provincial Total	Public Market	27	27	45	18	45	45	58	13	58
	Bus/Jeep Term.	11	11	16	5	16	16	39	23	39
	Total	38	38	61	23	61	61	97	36	97

Note: PU - Public Utilities

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

8.6.1 Water Supply

(1) Required water supply facilities

Urban water supply:

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

As reference, following requirements were also estimated:

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

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

Information pertaining to the expansion plan of Level III systems was arranged to be indicated in Table 8.6.1 and details in Table 8.6.2, however no information was available during this PW4SP preparation.

Rural water supply:

Rural water supply facilities required by target year shown in Table 8.6.3 were estimated as the number of Level II systems with number of communal faucets and number of Level I wells broken-down to deep and shallow wells. Three (3) untapped springs suitable for Level II system were confirmed during this PW4SP preparation.

(2) Required well drilling and rehabilitation equipment

Presently, only each one unit of truck-mounted percussion drilling rig, portable mechanized rotary drilling rig and air compressor are available at DPWH-DEO in the province. Among these equipment, rotary type rig is only capable to drill shallow wells with less than 10m depth owing to its penetration capacity and therefore not applicable for the planned shallow well construction.

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

Applicable type of well drilling equipment is determined considering the geological formation of the province that 50% of target area is medium to hard formation suitable to percussion type and the rest is soft to medium formation suitable to rotary type. Idling time for equipment overhauling/maintenance and rest days of workers are considered at 25% of the year.

Table S.6.1 Urban Water Supply Facilities Required by Target Year

Municipality	Reference on Expansion of Existing Level III System						Phase I (2000) Requirements				Phase II (2010) Requirements			
	Name of System (Operating Body)	Type	Coverage in 1995		Type of Water Sources ¹	Plan for Expansions ²	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (cu. m/day)	Number of Deep Well	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (cu. m/day)	Number of Deep Well
			No. of Brgy.	Served Population										
Adams	Save the Children Inc.	Urban	0	0	SP	None	0	0	0	0	0	0	0	0
		Rural	1	644										
		Total	1	644										
Bacarra	ENWAD (Bacarra)	Urban	18	5,970	DW	None	731	152	73	1	2,928	732	293	1
		Rural	10	4,667										
		Total	28	10,637										
Badoc	None	Urban	0	0	N.A.	N.A.	989	202	99	1	953	238	95	1
		Rural	0	0										
		Total	0	0										
Bangu	Malasin WS	Urban	0	0	SP	None								
		Rural	1	600										
		Total	1	600										
San Lorenzo W.S	None	Urban	1	1,525	SP	None	450	90	45	1	2,438	610	244	1
		Rural	0	0										
		Total	1	1,525										
Municipal Total	None	Urban	1	1,525	DW	None	725	139	73	1	10,460	2,615	1,046	1
		Rural	1	600										
		Total	2	2,125										
Batac Water District	None	Urban	16	4,389	SP	None								
		Rural	0	0										
		Total	16	4,389										
Burgos	Ablan W.S	Urban	0	0	SP	None								
		Rural	1	276										
		Total	1	276										
Agaga W.S	None	Urban	0	0	SP	None								
		Rural	1	296										
		Total	1	296										
Nagpartian W.S	None	Urban	1	505	SP	None								
		Rural	0	0										
		Total	1	505										
Tanap W.S	None	Urban	0	0	SP	None								
		Rural	1	364										
		Total	1	364										
Municipal Total	None	Urban	1	505	DW	None	177	35	18	1	943	236	94	1
		Rural	3	936										
		Total	4	1,441										
Carassi	None	Urban	0	0	N.A.	N.A.	0	0	0	0	0	0	0	0
		Rural	0	0										
		Total	0	0										

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

Municipality	Reference on Expansion of Existing Level III System				Phase I (2000) Requirements				Phase II (2010) Requirements				
	Name of System (Operating Body)	Type	Coverage in 1995 No. of Brgy. Served Population	Type of Water Sources	Plan for Expansions?	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (cu. m/day)	Number of Deep Well	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (cu. m/day)	Number of Deep Well
Curtiniao	Curtiniao W.S.	Urban	1	926	DW	None	0	0	0	263	66	26	1
		Rural	1	996									
		Total	2	1,922									
Dingras	Dingras Water District	Urban	6	5,805	DW	None	0	0	0	878	220	88	1
		Rural	2	1,408									
		Total	8	7,213									
Dumaling	Dumaling WS	Urban	0	0	SP	None	0	0	0	0	0	0	0
		Rural	1	828									
		Total	1	828									
Espantu	Espantu WS	Urban	4	3,035	SP	None	0	0	0	586	147	59	1
		Rural	0	0									
		Total	4	3,035									
Laong City (Capital)	Baasil North W.S.	Urban	0	0	SP	None	0	0	0	0	0	0	0
		Rural	1	835									
		Total	1	835									
Laong City (Capital)	Baasil South W.S.	Urban	0	0	SP	None	0	0	0	0	0	0	0
		Rural	1	1,130									
		Total	1	1,130									
Laong City (Capital)	Dibwa North W.S.	Urban	0	0	SP	None	0	0	0	0	0	0	0
		Rural	1	665									
		Total	1	665									
Laong City (Capital)	Dibwa South W.S.	Urban	0	0	SP	None	0	0	0	0	0	0	0
		Rural	1	735									
		Total	1	735									
Laong City (Capital)	INWAD (Laong)	Urban	39	21,235	DW	None	0	0	0	0	0	0	0
		Rural	0	0									
		Total	39	21,235									
Laong City (Capital)	La Paz Proper W.S.	Urban	0	0	DW	None	0	0	0	0	0	0	0
		Rural	1	595									
		Total	1	595									
Municipal Total	Municipal Total	Urban	39	21,235	N.A.	5,829	1,190	583	1	19,989	4,997	1,999	2
		Rural	5	3,960									
		Total	44	25,195									
Marcos	None	Urban	0	0	N.A.	378	74	38	1	1,288	322	129	1
		Rural	0	0									
		Total	0	0									
Nueva Era	None	Urban	0	0	N.A.	303	57	30	1	1,273	318	127	1
		Rural	0	0									
		Total	0	0									

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

Municipality	Reference on Expansion of Existing Level III System				Phase I (2000) Requirements				Phase II (2010) Requirements					
	Name of System (Operating Body)	Type	Coverage in 1995		Type of Water Sources ¹	Plan for Expansions ²	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (cu. m/day)	Number of Deep Well	Additional Population to be Served	Number of House Connections	Daily Average Water Demand (cu. m/day)	Number of Deep Well
			No. of Brgy.	Served Population										
Paguipud	Municipal Govt	Urban	2	3,390	SP	None	105	20	11	1	1,134	284	113	1
		Rural	3	2,195										
		Total	5	5,585										
Paoay	Cailagup W.S	Urban	0	0	DW	None								
		Rural	1	636										
		Total	1	636										
INWAD (Paoay)		Urban	15	1,210	DW	None								
		Rural	4	461										
		Total	19	1,671										
Nagbucalan W.S		Urban	0	0	DW	None								
		Rural	1	159										
		Total	1	159										
Municipal Total		Urban	15	1,210			2,125	417	213	1	4,715	1,179	472	1
		Rural	6	1,256										
		Total	21	2,466										
Pasuquin	INWAD (Pasuquin)	Urban	10	5,175	DW	None	0	0	0	0	1,129	282	113	1
		Rural	0	0										
		Total	10	5,175										
Piddig	None	Urban	0	0	N.A.	N.A.	460	92	46	1	3,144	786	314	1
		Rural	0	0										
		Total	0	0										
Puhit	Puhit W.S	Urban	2	2,010	DW	None	0	0	0	0	253	63	25	1
		Rural	0	0										
		Total	2	2,010										
San Nicolas	San Nicolas W.D.	Urban	15	17,356	DW	None	0	0	0	0	5,098	1,275	510	1
		Rural	0	0										
		Total	15	17,356										
Sarrat	Sarrat Water District	Urban	6	5,385	1 Dug Well and 2 Spring	None	254	51	25	1	2,599	650	260	1
		Rural	0	0										
		Total	6	5,385										
Solsona	None	Urban	0	0	N.A.	N.A.	101	20	10	1	3,641	910	364	1
		Rural	0	0										
		Total	0	0										
Vintar	INWAD (Vintar)	Urban	5	2,310	DW	None	564	118	56	1	2,316	579	232	1
		Rural	1	75										
		Total	6	2,385										
Provincial Total		Urban	141	80,226			11,191	2,657	1,320	14	66,028	16,509	6,603	21
		Rural	34	17,565										
		Total	175	97,791										

Note: 1. DW - Deep Well, SP - Spring, D&W - Dug Well, and Surf - Surface Water.
2. Refer to supporting Table 8.6.3 for details.

Table 8.6.2 Plan for Expansion of Existing Level III System

Municipality	Name of Operating Body	Additional Areas Barangay to be Covered	Additional Population to be Served	Additional Water Sources	
				Type ¹	Capacity (cu. m/day)
Adamis	Save the Children Inc.	N.A.	N.A.	N.A.	N.A.
Bacarra	INWAD	N.A.	N.A.	N.A.	N.A.
Bangui	Malasin WS	N.A.	N.A.	N.A.	N.A.
	San Lorenzo W.S	N.A.	N.A.	N.A.	N.A.
	Municipal Total	N.A.	N.A.		N.A.
Batac	Batac Water District	N.A.	N.A.	N.A.	N.A.
Burgos	Nagpartian W.S	N.A.	N.A.	N.A.	N.A.
	Ablan W.S	N.A.	N.A.	N.A.	N.A.
	Agaga W.S	N.A.	N.A.	N.A.	N.A.
	Tanap W.S	N.A.	N.A.	N.A.	N.A.
	Municipal Total	N.A.	N.A.		N.A.
Currimao	Currimao W.S	N.A.	N.A.	N.A.	N.A.
Dingras	Dingras Water District	N.A.	N.A.	N.A.	N.A.
Dumalneg	Dumalneg WS	N.A.	N.A.	N.A.	N.A.
Espiritu	Espiritu WS	N.A.	N.A.	N.A.	N.A.
Laoag City (Capital)	INWAD	N.A.	N.A.	N.A.	N.A.
	Dibwa North W.S	N.A.	N.A.	N.A.	N.A.
	Dibwa South W.S	N.A.	N.A.	N.A.	N.A.
	Bacsil North W.S	N.A.	N.A.	N.A.	N.A.
	Bacsil South W.S	N.A.	N.A.	N.A.	N.A.
	La Paz Proper W.S	N.A.	N.A.	N.A.	N.A.
	Municipal Total	N.A.	N.A.		N.A.
Paguopud	Municipal Gov't	N.A.	N.A.	N.A.	N.A.
Paoay	INWAD	N.A.	N.A.	N.A.	N.A.
	Callaguip W.S	N.A.	N.A.	N.A.	N.A.
	Nagbacalan W.S	N.A.	N.A.	N.A.	N.A.
	Municipal Total	N.A.	N.A.		N.A.
Pasquin	INWAD	N.A.	N.A.	N.A.	N.A.
Pinili	Pinili WS	N.A.	N.A.	N.A.	N.A.
San Nicolas	San Nicolas W.D.	N.A.	N.A.	N.A.	N.A.
Sarrat	Sarrat Water District	N.A.	N.A.	N.A.	N.A.
Vintar	INWAD	N.A.	N.A.	N.A.	N.A.
Provincial Total		N.A.	N.A.	N.A.	N.A.

Note: 1. DW - Deep Well, SP - Spring, DgW - Dug Well, and Surf - Surface Water Intake.

Table 8.6.3 Rural Water Supply Facilities Required by Target Year

Municipality	Level II				Phase I (2000) Requirements							Phase II (2010) Requirements								
	Number of System	No. of Communal Faucets	Number of Deep Wells			Number of Shallow Wells		Total	Number of Deep Wells			Number of Shallow Wells		Total						
			30 m	50 m	70 m	Sub-total	Shallow Wells		30 m	50 m	70 m	Sub-total	Shallow Wells							
Adams	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4	
Bacarra	0	0	0	82	0	82	0	0	0	0	0	82	0	0	0	0	73	0	73	
Badoc	0	0	0	148	0	148	0	0	0	0	0	148	0	0	0	0	89	0	89	
Bangui	0	0	12	0	0	12	0	0	0	0	0	12	0	0	0	0	36	0	36	
Batac	0	0	47	0	0	47	0	0	0	0	0	47	0	0	0	0	111	0	111	
Burgos	0	0	27	0	0	27	0	0	0	0	0	27	0	0	0	0	25	0	25	
Carassi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	
Curtiniao	0	0	0	41	0	41	0	0	0	0	0	41	0	0	0	0	32	0	32	
Dingras	1	20	0	37	0	37	0	0	0	0	0	37	0	0	0	0	93	0	93	
Dumaling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	
Espiritu	0	0	0	12	0	12	0	0	0	0	0	12	0	0	0	0	45	0	45	
Laong City (Capital)	0	0	0	106	0	106	0	106	0	0	0	106	0	175	0	0	175	0	175	
Marcos	0	0	0	21	0	21	0	0	0	0	0	21	0	45	0	0	45	0	45	
Nueva Era	0	0	0	21	0	21	0	0	0	0	0	21	0	16	0	0	16	0	16	
Pagudbud	1	20	11	0	0	11	0	0	0	0	0	11	45	0	0	0	45	0	45	
Paoay	0	0	0	46	0	46	0	0	0	0	0	46	0	52	0	0	52	0	52	
Paquiuin	0	0	0	49	0	49	0	0	0	0	0	49	0	63	0	0	63	0	63	
Piddig	1	20	0	23	0	23	0	0	0	0	0	23	0	54	0	0	54	0	54	
Pinili	0	0	0	68	0	68	0	0	0	0	0	68	0	46	0	0	46	0	46	
San Nicolas	0	0	0	37	0	37	0	0	0	0	0	37	0	34	0	0	34	0	34	
Sarrat	0	0	0	62	0	62	0	0	0	0	0	62	0	56	0	0	56	0	56	
Solsona	0	0	0	68	0	68	0	0	0	0	0	68	0	62	0	0	62	0	62	
Vintar	0	0	0	18	0	18	0	0	0	0	0	18	0	86	0	0	86	0	86	
Provincial Total	3	60	97	839	0	940	0	940	0	940	0	940	217	1,021	0	1,247	0	1,247	0	1,247

Medium size rotary drilling rig (truck-mounted top-head drive type for deep well):

Average performance

- 1 well/20 days (10 m/day of drilling rate with finishing work)

Annual accomplishment

- 13 wells/year (365 days/year ÷ 20 days/well x 0.75)

Required number

- 8 sets for 50% of the total 940 deep wells

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

Average performance

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

Annual accomplishment

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

Required number

- 11 sets for 50% of the total 940 deep wells

Well rehabilitation equipment:

Average performance

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

Annual accomplishment

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

Required number

- 3 sets for 10% of 940 Level I deep wells

Support vehicle:

Type - pick-up truck with winch, double cab

Required number

- 3 units for well rehabilitation

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

- 8 sets of medium size rotary rig for 50% of deep wells,
- 11 sets of medium size percussion rig for 50% of deep wells
- 2 sets of well rehabilitation equipment for 10% of deep wells (at least 1 set shall be held by the provincial government), and
- 3 units of support vehicle for well rehabilitation.

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

8.6.2 Sanitation

Table 8.6.4 Urban Household Toilets Required by Target Year

Municipality	Phase I (2000) Requirements										Phase II (2010) Requirements									
	Add'l HHs to be Served					No. of HHs Toilets					Add'l HHs to be Served					No. of HHs Toilets				
	Flush	Pour Flush	VIP Latrine	Total		Flush	Pour Flush	VIP Latrine	Total		Flush	Pour Flush	VIP Latrine	Total		Flush	Pour Flush	VIP Latrine	Total	
Adams	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bacarra	0	177	0	177	0	177	0	177	0	177	760	0	0	760	0	760	0	0	760	
Badoc	41	0	0	41	0	41	0	41	0	41	159	0	0	159	0	159	0	0	159	
Banqui	122	0	0	122	0	122	0	122	0	122	367	0	0	367	0	367	0	0	367	
Batac	405	0	0	405	0	405	0	405	0	405	1,324	0	0	1,324	0	1,324	0	0	1,324	
Burgos	58	0	0	58	0	58	0	58	0	58	137	0	0	137	0	137	0	0	137	
Carassi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Currimao	0	0	0	0	0	0	0	0	0	0	92	91	0	183	92	91	0	0	183	
Dingras	186	0	0	186	0	186	0	186	0	186	562	0	0	562	0	562	0	0	562	
Dumalneg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Espiritu	5	157	0	162	5	157	0	162	0	162	301	0	0	301	0	301	0	0	301	
Laag City (Capital)	96	287	0	383	96	287	0	383	0	383	3,871	0	0	3,871	0	3,871	0	0	3,871	
Marcos	65	0	0	65	65	0	0	65	0	65	141	0	0	141	141	0	0	0	141	
Nueva Era	53	31	0	84	53	31	0	84	0	84	146	0	0	146	146	0	0	0	146	
Pagudpud	177	0	0	177	177	0	0	177	0	177	393	0	0	393	393	0	0	0	393	
Paoay	5	35	0	40	5	35	0	40	0	40	677	0	0	677	677	0	0	0	677	
Pasauquin	30	178	0	208	30	178	0	208	0	208	513	0	0	513	513	0	0	0	513	
Piddig	62	0	0	62	62	0	0	62	0	62	373	0	0	373	373	0	0	0	373	
Philli	84	0	0	84	84	0	0	84	0	84	194	0	0	194	194	0	0	0	194	
San Nicolas	465	0	0	465	465	0	0	465	0	465	1,847	0	0	1,847	1,847	0	0	0	1,847	
Sarrat	126	0	0	126	126	0	0	126	0	126	685	0	0	685	685	0	0	0	685	
Solsoma	0	39	0	39	39	0	0	39	0	39	348	0	0	348	348	0	0	0	348	
Vintar	87	185	0	272	87	185	0	272	0	272	422	0	0	422	422	0	0	0	422	
Provincial Total	2,067	1,089	0	3,156	2,067	1,089	0	3,156	0	3,156	13,312	91	0	13,403	13,312	91	0	0	13,403	

Table 8.6.5 Rural Household Toilets Required by Target Year

Municipality	Phase I (2000) Requirements										Phase II (2010) Requirements									
	Add'l HHs to be Served					No. of HHs Toilets					Add'l HHs to be Served					No. of HHs Toilets				
	Flush	Pour Flush	VIP Latrine	Total		Flush	Pour Flush	VIP Latrine	Total		Flush	Pour Flush	VIP Latrine	Total		Flush	Pour Flush	VIP Latrine	Total	
Adams	22	10	0	32	22	10	0	32	0	45	73	0	118	0	45	73	0	118	0	
Bacarra	170	326	0	496	170	326	0	496	0	745	866	0	1,611	0	745	866	0	1,611	0	
Badoc	0	291	0	291	0	291	0	291	0	0	2,255	0	2,255	0	0	2,255	0	2,255	0	
Bangui	0	252	0	252	0	252	0	252	0	20	771	0	791	0	20	771	0	791	0	
Batac	0	1,149	0	1,149	0	1,149	0	1,149	0	0	2,812	0	2,812	0	0	2,812	0	2,812	0	
Burgos	115	328	0	443	115	328	0	443	0	92	571	0	663	0	92	571	0	663	0	
Carassi	0	111	0	111	0	111	0	111	0	0	61	0	61	0	0	61	0	61	0	
Currimao	128	298	0	426	128	298	0	426	0	62	756	0	818	0	62	756	0	818	0	
Dingras	195	0	0	195	195	0	0	195	0	76	2,264	0	2,340	0	76	2,264	0	2,340	0	
Dumalneg	19	0	0	19	19	0	0	19	0	37	56	0	93	0	37	56	0	93	0	
Espirito	0	651	0	651	0	651	0	651	0	0	1,281	0	1,281	0	0	1,281	0	1,281	0	
Laoag City (Capital)	129	906	0	1,035	129	906	0	1,035	0	198	3,939	0	4,137	0	198	3,939	0	4,137	0	
Marcos	0	259	0	259	0	259	0	259	0	0	1,144	0	1,144	0	0	1,144	0	1,144	0	
Nueva Era	0	333	0	333	0	333	0	333	0	0	388	0	388	0	0	388	0	388	0	
Paguapud	251	21	0	272	251	21	0	272	0	289	1,146	0	1,435	0	289	1,146	0	1,435	0	
Paoy	13	496	0	509	13	496	0	509	0	77	1,403	0	1,480	0	77	1,403	0	1,480	0	
Pasauquin	0	1,180	0	1,180	0	1,180	0	1,180	0	0	1,487	0	1,487	0	0	1,487	0	1,487	0	
Pliddig	0	151	0	151	0	151	0	151	0	0	1,199	0	1,199	0	0	1,199	0	1,199	0	
Pinili	0	268	0	268	0	268	0	268	0	0	1,251	0	1,251	0	0	1,251	0	1,251	0	
San Nicolas	0	98	0	98	0	98	0	98	0	0	902	0	902	0	0	902	0	902	0	
Sarrat	0	105	0	105	0	105	0	105	0	0	1,142	0	1,142	0	0	1,142	0	1,142	0	
Solsona	0	212	0	212	0	212	0	212	0	0	1,575	0	1,575	0	0	1,575	0	1,575	0	
Vintar	0	1,603	0	1,603	0	1,603	0	1,603	0	0	2,046	0	2,046	0	0	2,046	0	2,046	0	
Provincial Total	1,042	9,048	0	10,090	1,042	9,048	0	10,090	0	1,641	29,388	0	31,029	0	1,641	29,388	0	31,029	0	

Table 8.6.6 Public School Toilets Required by Target Year

Municipality	Phase I (2000) Requirements			Phase II (2010) Requirements		
	Add'l Public School Students to be Served	No. of Toilet Units	No. of Toilet Facilities	Add'l Public School Students to be Served	No. of Toilet Units	No. of Toilet Facilities
Adams	0	0	0	15	0	0
Bacarra	344	7	0	879	18	4
Badoc	0	0	0	616	12	2
Bangui	0	0	0	443	9	2
Batac	0	0	0	1,099	22	4
Burgos	0	0	0	299	6	1
Carassi	0	0	0	17	0	0
Currimao	0	0	0	317	6	1
Dingras	0	0	0	737	15	3
Dumalneg	0	0	0	31	1	0
Espiritu	42	1	0	333	7	1
Laoag City (Capital)	7,343	147	29	2,277	46	9
Marcos	193	4	1	358	7	1
Nueva Era	203	4	1	196	4	1
Pagudpud	0	0	0	544	11	2
Paoay	0	0	0	407	8	2
Pasquin	1,086	22	4	699	14	3
Piddig	0	0	0	448	9	2
Pinili	134	3	1	403	8	2
San Nicolas	0	0	0	822	16	3
Sarrat	0	0	0	479	10	2
Solsona	847	17	3	579	12	2
Vintar	1,178	24	5	606	12	2
Provincial Total	11,370	229	44	12,604	253	49

Table 8.6.7 Public Toilets Required by Target Year

Municipality	Type	Phase I (2000) Requirements	Phase II (2010) Requirements
		Number of Public Toilets	Number of Public Toilets
Adams	Public Market	1	0
	Bus/Jeepney Term.	0	1
	Total	1	1
Bacarra	Public Market	0	0
	Bus/Jeepney Term.	0	1
	Total	0	1
Badoe	Public Market	1	1
	Bus/Jeepney Term.	0	1
	Total	1	2
Bangui	Public Market	1	0
	Bus/Jeepney Term.	0	1
	Total	1	1
Batac	Public Market	1	1
	Bus/Jeepney Term.	1	1
	Total	2	2
Burgos	Public Market	1	1
	Bus/Jeepney Term.	1	1
	Total	2	2
Carassi	Public Market	1	0
	Bus/Jeepney Term.	0	1
	Total	1	1
Currinao	Public Market	1	1
	Bus/Jeepney Term.	0	1
	Total	1	2
Dingras	Public Market	1	1
	Bus/Jeepney Term.	1	1
	Total	2	2
Dumalneg	Public Market	1	0
	Bus/Jeepney Term.	0	1
	Total	1	1
Espiritu	Public Market	0	1
	Bus/Jeepney Term.	0	1
	Total	0	2
Laoag City (Capital)	Public Market	1	1
	Bus/Jeepney Term.	1	1
	Total	2	2

Table 8.6.7 Public Toilets Required by Target Year (Cont'd.)

Municipality	Type	Phase I (2000) Requirements	Phase II (2010) Requirements
		Number of Public Toilets	Number of Public Toilets
Marcos	Public Market	1	1
	Bus/Jeepney Term.	0	1
	Total	1	2
Nueva Era	Public Market	1	0
	Bus/Jeepney Term.	0	1
	Total	1	1
Pagudpud	Public Market	1	1
	Bus/Jeepney Term.	1	1
	Total	2	2
Paoay	Public Market	0	1
	Bus/Jeepney Term.	0	1
	Total	0	2
Pasuquin	Public Market	1	1
	Bus/Jeepney Term.	0	1
	Total	1	2
Piddig	Public Market	1	0
	Bus/Jeepney Term.	0	1
	Total	1	1
Pinili	Public Market	0	0
	Bus/Jeepney Term.	0	1
	Total	0	1
San Nicolas	Public Market	1	0
	Bus/Jeepney Term.	0	1
	Total	1	1
Sarrat	Public Market	1	0
	Bus/Jeepney Term.	0	1
	Total	1	1
Solsona	Public Market	0	1
	Bus/Jeepney Term.	0	1
	Total	0	2
Vintar	Public Market	1	1
	Bus/Jeepney Term.	0	1
	Total	1	2
Provincial Total	Public Market	18	13
	Bus/Jeepney Term.	5	23
	Total	23	36

**C. SECTOR IMPLEMENTATION
ARRANGEMENTS**

9. SECTOR MANAGEMENT PLAN
9.4 Project Management Arrangements

Table 9.4.1 Format for Level I Project Data

Form _____

PROPOSED LEVEL I PROJECT DATA	
Notice : This form shall be accomplished upon instruction on PST/PWSD	
LOCATION	1.1 Barangay/Sitio _____ 1.3 Province _____
	1.2 Municipality _____ 1.4 Region _____
POP. DATA	2.1 Total Community/Barangay Population _____ 2.3 Proposed Population to be Served _____
	2.2 Total Number of Households _____ 2.4 Proposed Number of Households to be Served _____
INFORMATION ON THE WELL SITE	3.1 Ownership : <input type="checkbox"/> Public <input type="checkbox"/> Private
	3.2 Description :
DESCRIPTION OF EXISTING NEARBY SOURCE(S) (Use separate sheets if necessary)	3.3 Location:
	3.4 Donor (If Private Lot):
DESCRIPTION OF EXISTING NEARBY SOURCE(S) (Use separate sheets if necessary)	4.1 Type of Point Source: <input type="checkbox"/> Deep Well <input type="checkbox"/> Shallow Well <input type="checkbox"/> Spring <input type="checkbox"/> Others (dug well pond)
	4.2 Ownership : <input type="checkbox"/> Public <input type="checkbox"/> Private
4.3 For wells : Casing diameter _____ m. or _____ m. Casing depth _____ ft. or _____ m. Water level Well _____ ft. or _____ m. Well capacity/yield _____ gpm. or _____ m. 4.4 For Springs : Capacity/yield _____ gpm. or _____ lps. Approx. elevation above or below _____ Service Area _____ ft. or _____ m. Location <input type="checkbox"/> Inside of service area <input type="checkbox"/> Outside of service area Approximate distance from center of service area _____ km.	
Prepared by : _____	
Municipal Liaison Staff Date _____	

Table 9.4.2 Format for Level II Feasibility Study

Form

FEASIBILITY STUDY (Level II) <small>Notice : This form shall be accomplished upon instruction of the PST/PWSO.</small>		Barangay Province	Municipality Region
PROJECT SUMMARY			
POPULATION DATA	1. Present Population	2. Design Population	3. Number of Households
			6. Number of Faucets
TECHNICAL DATA	4. Type of Source <input type="checkbox"/> Spring <input type="checkbox"/> Well <input type="checkbox"/> Surface Water	5. Type of System <input type="checkbox"/> Gravity <input type="checkbox"/> Pumped	8. Pumping Time _____ Hours per Day
	7. Pump Horsepower _____ HP	9. Total Average Daily Demand _____ Liters	11. Pump Discharge Capacity _____ LPS
	10. Storage Tank Capacity _____ Liters		
FINANCIAL DATA	12. Total System Cost P _____	13. Maximum Loan Amount P _____	14. Interest Rate _____
	15. Local Equity P _____	16. Funding Cost per Household P _____	17. Repayment Period (months) _____
	18. Type of Local Equity <input type="checkbox"/> Cash <input type="checkbox"/> Labor <input type="checkbox"/> Materials <input type="checkbox"/> Others, _____		
	19. Total Monthly Expense P _____	20. Monthly Fee Per Household P _____	
ANNEXES	<input type="checkbox"/> 1 Survey Form <input type="checkbox"/> 5 Design of Pipe Lines <input type="checkbox"/> 9A Fittings Schedule <input type="checkbox"/> 12 Financial Analysis <input type="checkbox"/> 2 Map of the Project Area <input type="checkbox"/> 6 Design of Reservoir (G.I. Pipes) <input type="checkbox"/> 13 Availability of Local <input type="checkbox"/> 3 Design Criteria and and Pump <input type="checkbox"/> 9B Fittings Schedule Equity Basic Design Data <input type="checkbox"/> 7 Detailed Design Plan <input type="checkbox"/> 10 Bill of Materials <input type="checkbox"/> 4 Schematic Diagram of <input type="checkbox"/> 8 Pipes Schedule <input type="checkbox"/> 11 Cost Summary the System		
Prepared by : _____ Date		Endorsed by : _____ Date	
Municipal Liason Staff		PST/PWSO Coordinator	

Annex 1

SURVEY FORM
Rural Water Supply Project

A. LOCATION

Barangay : _____ Province : _____
Municipality : _____ Region Number : _____

B. GENERAL INFORMATION

1. Population _____
2. Number of households _____
3. Distance from poblacion _____ kilometers
4. Availability of electricity Yes No
5. Distance from electric line _____ kilometers
6. Power cost per kilowatt hour P _____
7. Availability of public transportation _____
8. Main livelihood of residents Land transport
 Water transport
 Farming
 Industry Others
 Fishing

C. TECHNICAL INFORMATION

1. Are there reliable sources of potable water?
 Yes No

a) For Wells

Well capacity : _____ lps
Casing diameter : _____
Casing depth : _____

Water level from top of well : _____

Location : Within service area
 Outside _____ M. from service area

b) For Springs

Average dry season flow : _____ GPM LPS

Relative elevation of spring

a. _____ ft. m. above service area
b. _____ ft. m. below service area

Location : Within service area
 Outside _____ m. from service area

2. Are there water supply system materials and equipment (pumps, pipes, fittings) which can be donated for this project from other source?

Yes No

For pumps : Type : _____ Power : _____ HP

For pipes : Galvanized Iron PVC
 Others, specify _____

3. Is there an existing water tank that can be used? Yes No

Type : Steel Reinforced Concrete

Capacity : _____ Gallons Cubic Meters

Location: (Please indicate in the map of the project area)

Relative elevation with respect to service area _____ ft. _____ m.

4. Are there other sites where water tanks may be erected? Yes No

Location: (please indicate in the map of the project area)

Relative elevation with respect to service area _____ ft. _____ m.

5. Does the barrio have skilled personnel? Yes No

If yes, how many? Estimated Number

Plumbers : _____
Masons : _____
Carpenters : _____
Others : _____

If no, are there competent contractors near the area?

Plumbing contractor : Yes No
Tank fabricator : Yes No

Are there suppliers of materials (pumps, pipes, fittings) in the municipality?

Yes No

D. FINANCIAL INFORMATION

1. What can the barangay provide as local equity?

Cash : P _____
 Labor : _____ man-days
 Materials : Sand : _____ cu. m.
 Gravel : _____ cu. m.
 Cement : _____ bags
 Others, specify : _____

2. Have the people been informed of the current financing policies for Level II systems, particularly the monthly fees required to repay loan & provide for O & M?

Yes No

3. How much are the people willing to pay per household per month as a water fee?

Below P 6.00 P 10.00 - 15.00 Others
 P 6.00 - 10.00 15.00 - 20.00 Specify : _____

4. Average income per household P _____ per month

E. INSTITUTIONAL INFORMATION

1. Is there an existing association who is ready, willing and able to manage the system

Yes No

If yes, please specify. _____

2. Are people willing to join a water association to operate and manage a water supply system?

Yes No

3. How many households are willing to be members? _____ households.

4. Name at least three (3) leaders of the community who can act as officers of the association, if required.

Name	Address
_____	_____
_____	_____
_____	_____

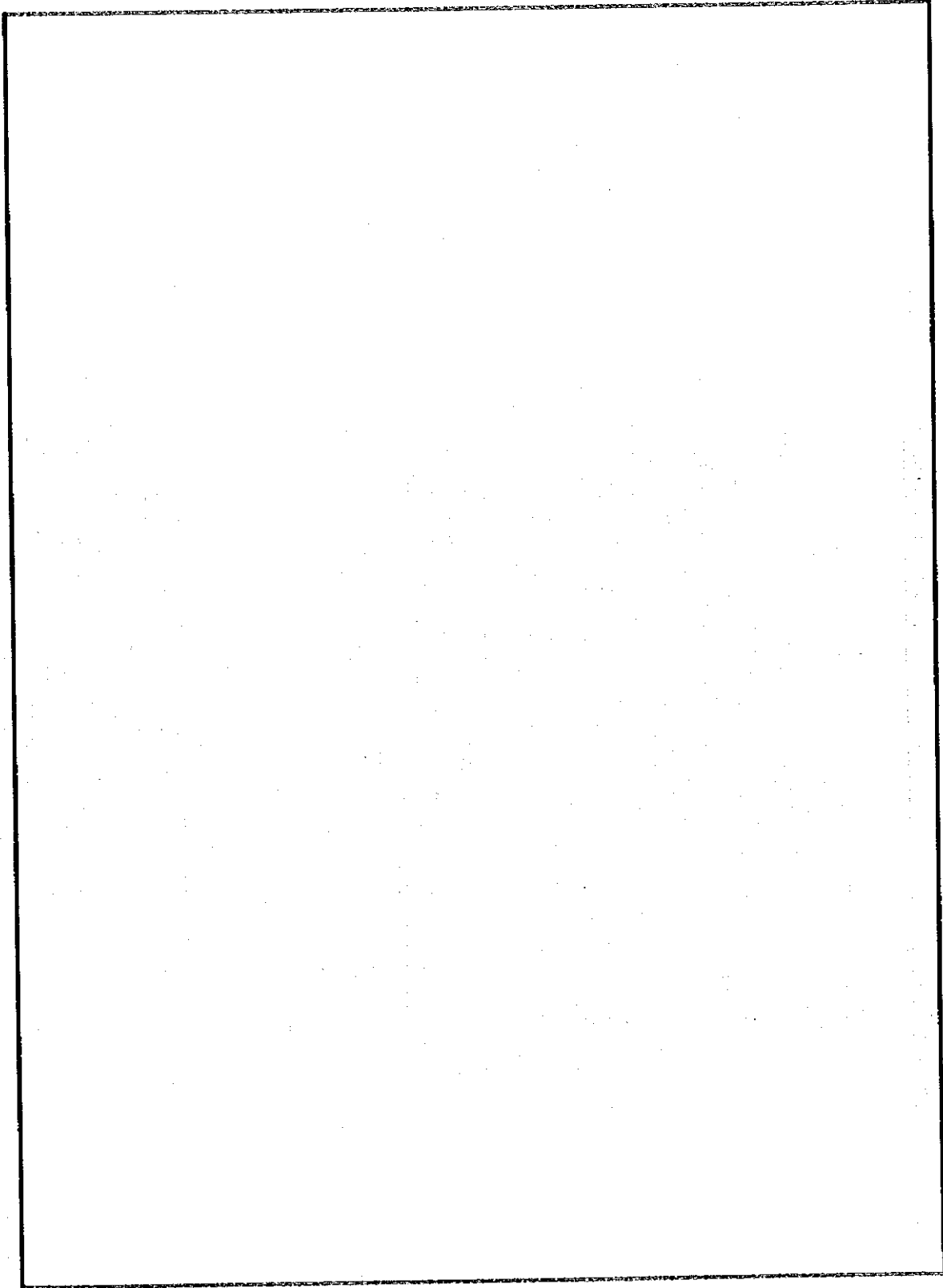
F. MAP OF THE AREA

Please attach map of the area proposed to be served. Indicate location of houses, buildings and other structures to be served including roads, the water source(s) and possible locations of storage tanks. The map should preferably be drawn to scale.

Important : If map cannot be drawn to scale, indicate distance measurements between important points along roads, or possible routes of distribution pipes with households properly indicated. For rolling terrain, indicate elevation differences between measurement points.

G. REMARKS :

Annex 2
MAP OF THE PROJECT AREA
Rural Water Supply Project



Annex 3

DESIGN CRITERIA AND BASIC DESIGN DATA
Rural Water Supply Project

I. Design Criteria

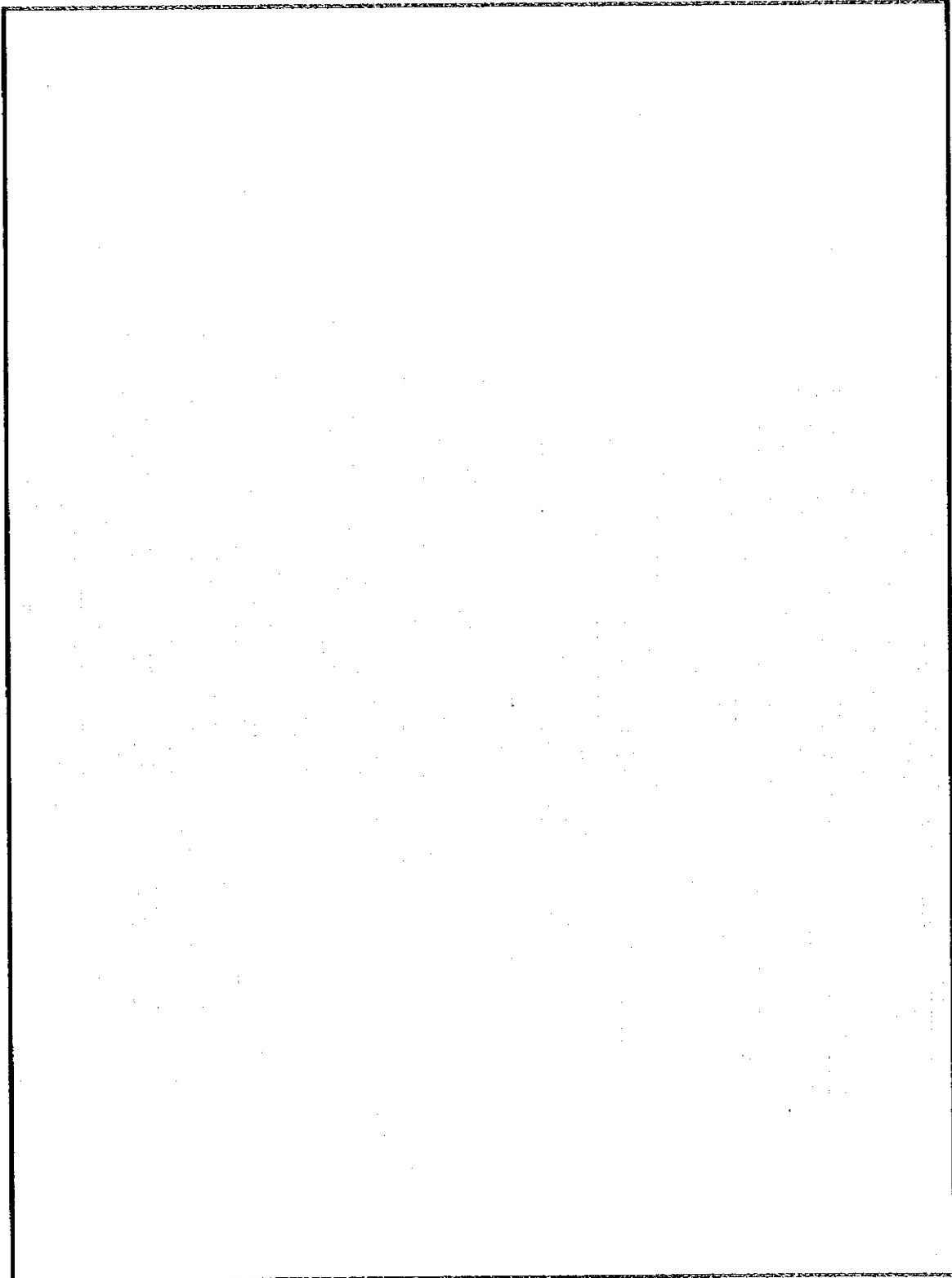
1. Design Period : 5 years
2. Population :
 - Annual Growth : 3%
 - Average Household Size : 6 persons/HH
 - Design Population : Present Population x 1.16
3. Per Capita Water Consumption :
 - Level II : 60 lpcd
 - Level II with garden : 75 lpcd
 - Level III : 100 lpcd
4. Water Demand :
 - Average Day Demand : Design Population X Per Capita Consumption
 - Maximum Day Demand : 1.3 X Average Day Demand
 - Maximum Hour Demand : 2.5 X Average Day Demand
5. Pump Operation :
 - Pumping Hours : 8 - 15 hours
 - Pumping Rate : Maximum Day Demand/PumpingHrs. = _____
6. Storage Capacity : 1/4 of Average Day Demand
7. System Pressure : 5 - 10 psi at faucet
8. Households Served Per Faucet : 4 - 6 HH

II. Basic Design Data

1. Present Population : _____
2. Design Population (Present Population X 1.16) : _____
3. Average Day Demand: _____ X _____ : _____
(Per Capita Consumption) (Design Pop.)
4. Maximum Day Demand: 1.3 X _____ : _____
(Average Day Demand)

Annex 4

SCHEMATIC DIAGRAM OF THE SYSTEM
Rural Water Supply Project



Annex 6
DESIGN OF RESERVOIR AND PUMP
 Rural Water Supply Project

A. DESIGN

1. Determine Capacity of Reservoir, (C_r)

$$C_r = 1/4 \times \text{Average Day Demand}$$

$$C_r = 1/4 \times D_a \text{ (LPD)}$$

$$C_r = \text{_____ liters}$$

2. Determine Minimum Water Elevation, (WL_m)

$$WL_m = \text{total head loss} + \text{Minimum Pressure in Main (Meters)}$$

For Barangay System, Min. Pressure = 5 psi (use 3M.)

For Poblacion System, Min. Pressure = 10 psi (use 7M.)

$$WL_m = \text{_____ M.}$$

Note : The bottom of the storage tank should be higher than this elevation.

B. DESIGN OF PUMP

1. Determine Pump Capacity, Q_p (LPS)

$$Q_p = \text{Max. Day Demand (LPD)} / \text{Operating Time (Sec.)}$$

$$Q_p = 78 P_d / T \quad \text{where: } P_d = \text{Design Population}$$

$T = \text{Operating Time in Seconds}$

$$Q_p = \text{_____ LPS}$$

2. Calculate Total Dynamic Head, TDH (Meters)

$$TDH = \text{Depth of Pumping Level} + \text{by Maximum Reservoir Elevation} + \text{friction loss}$$

$$TDH = \text{_____ m}$$

3. Calculate Brake Horsepower Requirement :

$$\text{Brake Horsepower} = \frac{Q_p \times TDH}{75 \times \text{Efficiency}}$$

$$\text{Brake Horsepower} = \text{_____ Hp}$$

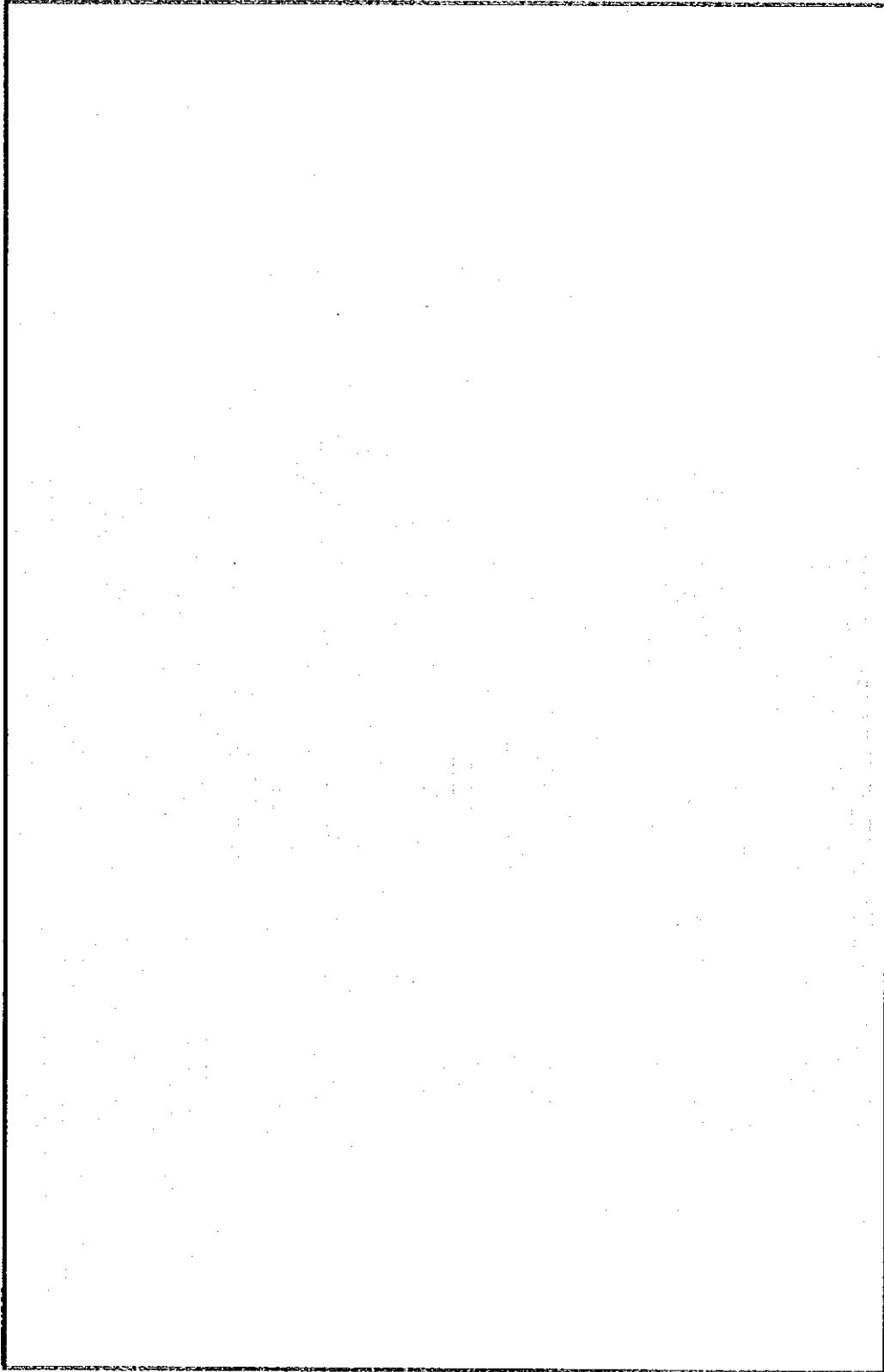
Where :

Efficiency for Centrifugal Pump, 30-60 %

Efficiency for Submersible Pump, 50-60 %

Efficiency for Jetmatic Pump, 20-30 %

Annex 7
DETAILED DESIGN PLAN
Rural Water Supply Project



Annex 8
PIPES SCHEDULE

Rural Water Supply Project

PIPE (1)	DIAMETER mm	SECTION (2)	LENGTH m	REQUIRED PIPES (3)	ACTUAL NO. OF PIPES (4)	ADDITIONAL PIPES (5)

Annex 9A
FITTINGS SCHEDULE (G.I. PIPES)
 Rural Water Supply Project

NODES	SECT LENGTH	COUPLING		UNION PATENTE		TEE STD.	TEE REDUCER	BUSHING REDUCER	ELBOW STD ELBOW REDUCER	COUPLING REDUCER	FAUCET	NIPPLE	VALVES
		Qty.	Size	Qty.	Size								

**Annex 11
COST SUMMARY**

_____ **Rural Water Supply Project**

I. ESTIMATED COST OF THE SYSTEM

- | | | |
|--|---|---|
| 1. a) Cost of Pipes | P | |
| b) Cost of Fittings | | |
| Total Cost of Pipes and Fittings | | P |
| 2. Cost of Reservoir | | |
| 3. Cost of Pump | | |
| 4. Labor Cost | | |
| a) 10% of Pipes & Fittings (For G.I. Pipes) | | |
| b) 25% of Pipes & Fittings (For PVC Pipes) | | |
| 5. Cost of Freight and Handling | | |
| 6. Contingencies 5% (Pipes & Fittings - Labor) | | |
| Total Cost of the System | | P |

For gravity system, omit cost of pump.

II. FINANCIAL DATA

- | | | |
|-----------------------------|---|--|
| 1. Total Cost of the System | P | |
| 2. Local Equity | | |
| 3. Amount of Loan | | |

Annex 12
FINANCIAL ANALYSIS
Rural Water Supply Project

A. RELEVANT DATA

- 1. Pumping Hours : _____ hrs.
- 2. Pump Horsepower : _____ HP
- 3. Cost/KWH : P _____
- 4. Pump Cost : P _____
- 5. Amount of Loan : P _____
- 6. Loan Terms : _____ % (interest per annum)
: _____ years (Repayment Period)
- 7. Number of Households : _____

B. COMPUTATION OF MONTHLY EXPENSES (Omit non-applicable items)

- 1. Operations
 - a. Salaries _____ x _____ = P _____
 - b. Office Supplies _____ x _____ = P _____
 - c. Power _____ x _____ = P _____
 - d. Chemical _____ x _____ = P _____
 - e. Miscellaneous _____ x _____ = P _____
- 2. Asset Replacement
 - a. Pump _____ / _____ = P _____
Life (mos.)
 - b. Pipelines _____ / _____ = P _____
Life (mos.)
 - c. Tank _____ / _____ = P _____
Life (mos.)
 - d. Others _____ / _____ = P _____
Life (mos.)
- 3. Amortization _____ x _____ = P _____
(CRF) (Loan Amt.)
- 4. Maintenance (2% of Capital Equipt.costs annually)
.02 X _____ /12 = P _____
- 6. Total Monthly Expenses = P _____

C. COMPUTATION OF WATER FEE

Monthly Water Fee Per Household :

_____ / _____ = P _____
(Total Monthly Expenses) (No. of HH)

**Annex 13
AVAILABILITY OF LOCAL EQUITY**

	Item	Amount
I. Cash		P _____

II. Labor

Type of Labor	No. of Workers	No. of Days	Rate Per Day	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	
_____	_____	_____	_____	

III. Materials

Type of Materials	Quantity	Unit Cost	
_____	_____	_____	
_____	_____	_____	
_____	_____	_____	
_____	_____	_____	
_____	_____	_____	

TOTAL

P _____

<p>I certify that the items listed above represent the local share of the project cost.</p> <p align="center">_____ Association President</p> <p align="center">_____ Date</p>	<p>Noted by :</p> <p align="center">_____ Municipal Sector Liason</p> <p align="center">_____ Date</p>
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