

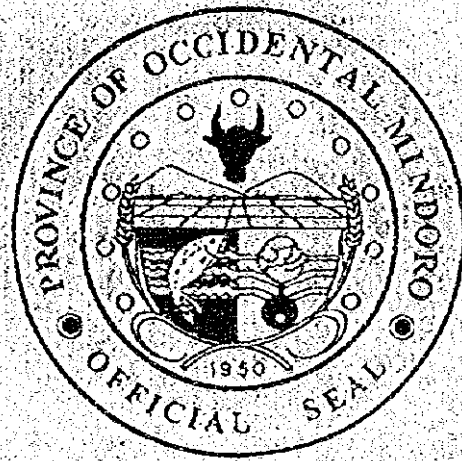
JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF THE INTERIOR AND LOCAL GOVERNMENT
THE REPUBLIC OF THE PHILIPPINES

STUDY ON THE
PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN
IN
THE REPUBLIC OF THE PHILIPPINES

VOLUME III- 4

SUPPORTING AND DATA REPORT

PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN
FOR THE PROVINCE OF
OCCIDENTAL MINDORO



FEBRUARY 1996

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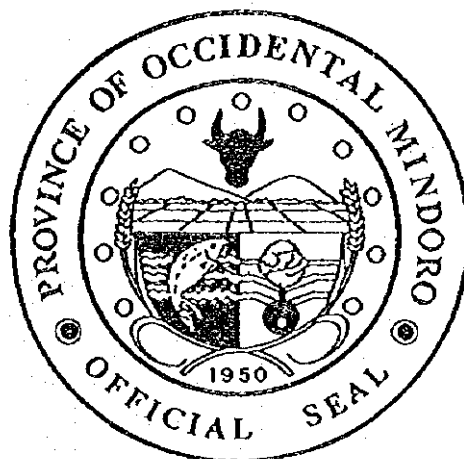
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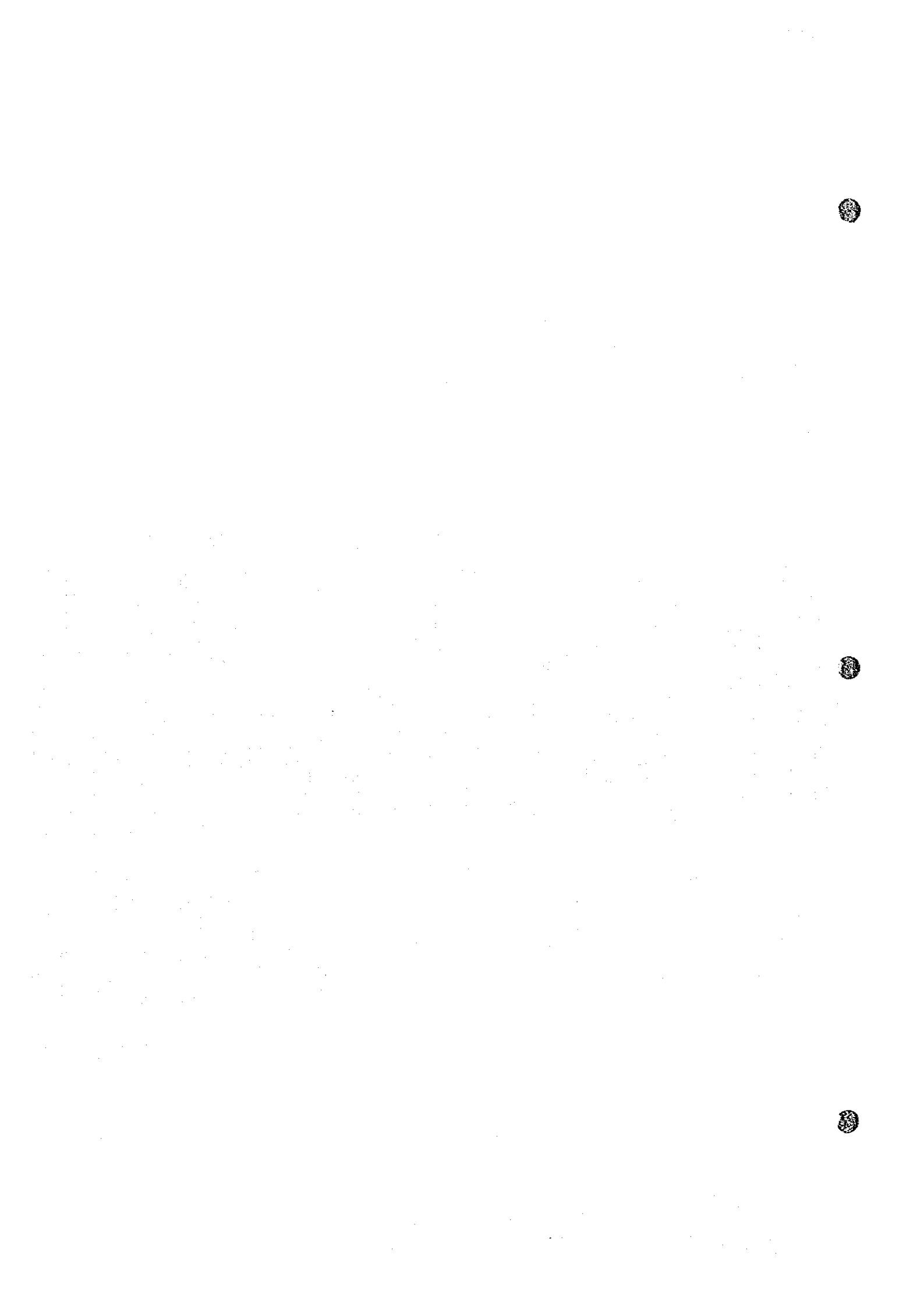
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**PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN**

VOLUME III - 4 SUPPORTING AND DATA REPORT

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SANITATION SECTOR PLAN**

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PROVINCIAL WATER SUPPLY, SEWERAGE AND SANITATION SECTOR PLAN

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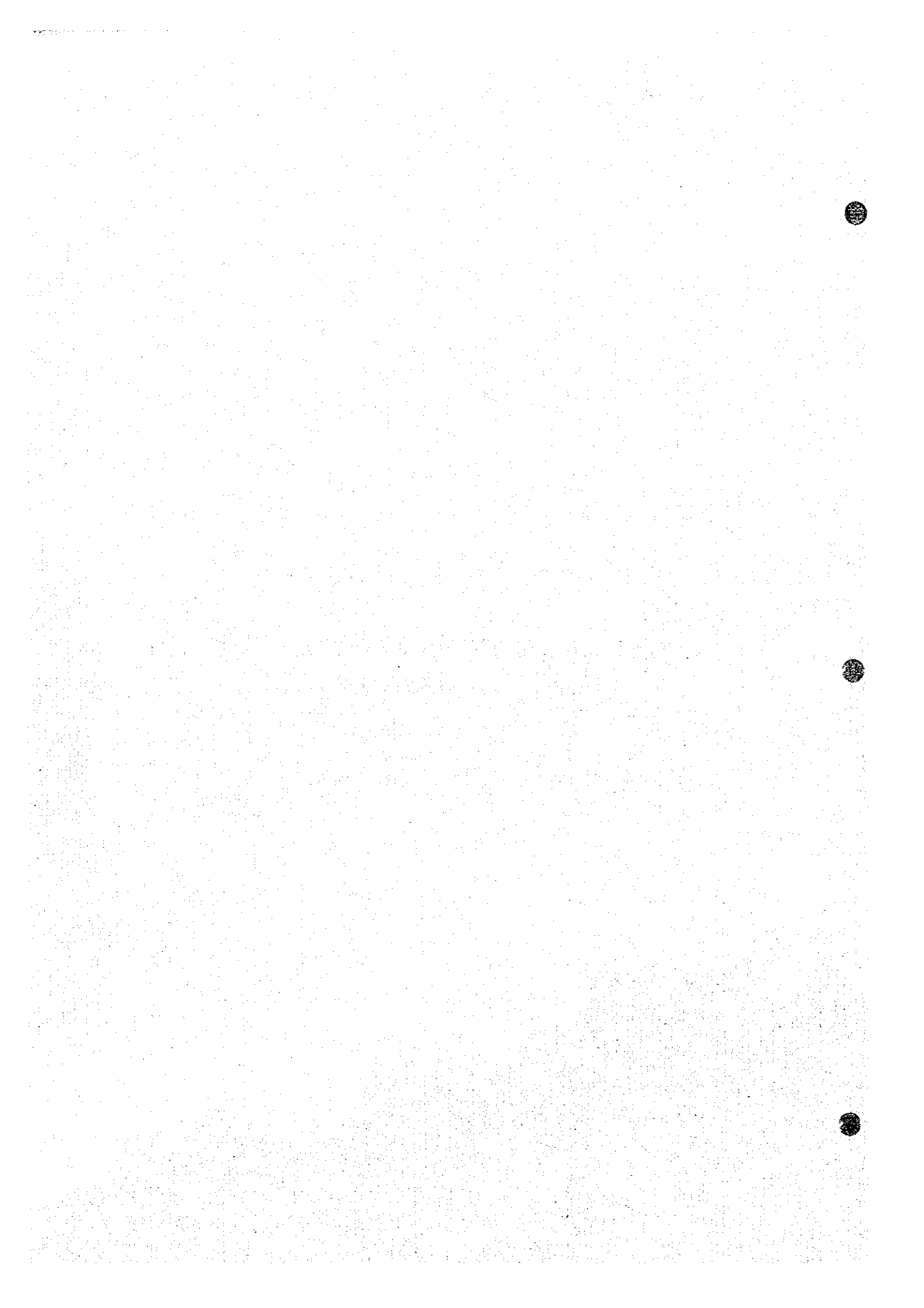
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SUPPORTING REPORT

**A. BACKGROUND INFORMATION AND
EXISTING CONDITIONS**

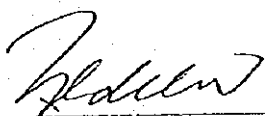



- 1. INTRODUCTION
- 1.3 The Provincial Plan for the Province of Occidental Mindoro
- 1.3.1 Preparation of the Plan

MINUTES OF DISCUSSIONS
ON
THE INCEPTION REPORT
FOR
STUDY ON PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN
IN
THE REPUBLIC OF THE PHILIPPINES

AGREED UPON BETWEEN
THE DEPARTMENT OF THE INTERIOR AND
LOCAL GOVERNMENT
AND
STUDY TEAM OF
JAPAN INTERNATIONAL COOPERATION AGENCY

MANILA, SEPTEMBER 5, 1994


HON. YOLANDA MA. L. DE LEON
Assistant Secretary
Dept. of the Interior and Local Government


MR. MASATOSHI MOMOSE
Team Leader, Study Team
Japan Int'l Cooperation Agency

Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, dispatched the Study Team to the Republic of the Philippines on August 31, 1994 to conduct "the Study on Provincial Water Supply, Sewerage and Sanitation Sector Plan" (hereinafter referred to as "the Study") in accordance with the Implementing Arrangement for the Study between the JICA and the Department of the Interior and Local Government (hereinafter referred to as "DILG") on November 19, 1993.

A series of discussions was made on the Inception Report for the Study between the Study Team and officials of DILG. In the course of discussions, both parties have agreed to the main items described in the Inception Report. The list of attendants in the series of discussions is presented in Appendix A.

1. Objectives and Scope of Work for the Study

- (1) Formulation of long-term provincial development plan for water supply, sewerage and sanitation sector to the year 2010 through technical assistance to the provincial staff; and
- (2) Preparation of medium-term (five year) sector investment plan based on the long-term development plan.

The Study will be conducted in two stages for the two batches.

2. Study Area

The study area covers the following nine (9) provinces and are grouped as follows:

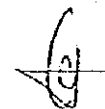
BATCH No. 1

- (1) Zambales
- (2) Rizal
- (3) Mindoro Oriental
- (4) Mindoro Occidental

BATCH No. 2

- (1) Abra
- (2) Ilocos Norte
- (3) Ilocos Sur
- (4) Nueva Vizcaya
- (5) Batanes

For Rizal province, four (4) municipalities covered by the MWSS will be excluded in the future plan. The conduct of the Study for Batch No. 2 shall be finally determined after ascertaining the peace and order conditions in the subject provinces by the end of the Batch No. 1 Study.



3. General Approach and Methodology to the Study

(1) Planning framework for future sector development

- a. Base years shall be determined after discussion with NEDA to conform with national plans and programs.
- b. The PW4SP shall be prepared within the context of existing plans and projects. However some modifications may be made where appropriate to reflect the updated information.
- c. Conformity and consistency of the Study with the national plans and programs such as the NEDA Board Resolutions Nos. 4 and 5 - Series 1994; the Water Sector Reforms Study and the National Urban Sewerage and Sanitation Strategy Plan for the Philippines.

(2) Establishment of data base

To maintain consistency and compatibility with the existing data base of previously developed PW4SPs, the Study will adopt the same in principle and will be modified if needed.

(3) Water source development

Water Availability Maps will be developed through update of the NWRB's Rapid Assessment Report and other studies.

(4) Community development and training

Training needs assessment will be undertaken to guide the Study in identifying manpower development strategies and programs. Existing local training resources and activities will be evaluated. A community development study will be undertaken entailing model studies for each of the three service levels in every province.

(5) Technology Transfer

Capacity building and technology transfer are important elements of the Study. To the extent possible, counterpart staff at the local and national levels shall participate actively in data collection and analysis, formulation of strategic recommendations, and the preparation of the PW4SP.

4. Implementation Set-Up for the Study

In accordance with the Implementing Arrangements between the DILG and the JICA, the DILG shall:

- (1) secure the safety of the JICA Study Team;
- (2) assign DILG counterpart staff members who will coordinate and assist PSPTs at the provincial level;
- (3) Set-up PSPTs by respective provincial governments in the study area and secure budget to carry out the Study;
- (4) through PSPT in each study area province; facilitate and coordinate in data gathering with municipal government and other agencies concerned, and participate in workshops and preparation of PW4SP.
- (5) facilitate coordination with concerned agencies like DPWH, DOH, NEDA, LWUA and with appropriate bodies such as PCC (FW4SP) and the like.

The JICA shall:

- (1) pursue technology transfer to the Philippine counterpart personnel in the course of the Study and;
- (2) assist PSPTs in the preparation of the PW4SP.

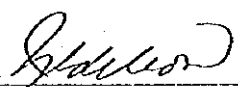
LIST OF ATTENDANTS IN THE SERIES OF DISCUSSIONS

<u>ATTENDANTS</u>	<u>DESIGNATION</u>
A. DILG	
1. HON. YOLANDA MA. L. DE LEON	Assistant Secretary, Plans and Programs
2. MR. ORVILLE M. ROQUE	Project Manager I, PMO
3. MR. ROGELIO B. OCAMPO	Chief, Planning Div., PMO
4. MS. ELLEN I. PASCUA	Chief, Admin. Div., PMO
5. MS. FE CRISILLA M. BANLUTA	PW4SP Overall Coordinator, PMO
B. OTHER AGENCIES	
1. MR. ANTONIO DE VERA	Administrator, LWUA
2. MR. ROGELIO A. FLORES	Director, PMO-RWS, DPWH
3. DR. MARIO VILLAVERDE	Director, EHS, DOH
C. JICA	
1. MR. MASAO TATEBA	Supervisor, Second Dev't. Study Div., Social Dev't. Study Dept.
2. MR. EIJI IWASAKI	Asst. Resident Representative, Phil. Office
D. JICA STUDY TEAM	
1. MR. MASATOSHI MOMOSE	Team Leader
2. MR. MASUOMI HIROYAMA	Water Supply Engr.
3. MR. KENSUKE ICHIKAWA	Hydrogeologist
4. MS. YOLANDA M. MINGOA	Sanitary Engr.
5. MR. WILFRIDO C. BARREIRO	Institutional/CD/T Specialist
6. MR. ALLEN M. LOWE	System Engr.
7. KENJI KASAMATU	Coordinator

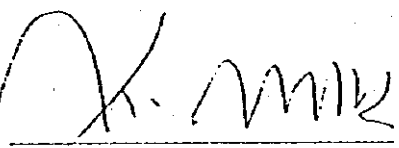
MINUTES OF DISCUSSIONS
ON
THE PROGRESS REPORT I
FOR
STUDY ON PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN
IN
THE REPUBLIC OF THE PHILIPPINES

AGREED UPON BETWEEN
THE DEPARTMENT OF THE INTERIOR AND
LOCAL GOVERNMENT
AND
STUDY TEAM OF
JAPAN INTERNATIONAL COOPERATION AGENCY

MANILA, DECEMBER 20, 1994



HON. YOLANDA MA. L. DE LEON
Assistant Secretary
Dept. of the Interior and Local Government



MR. MASATOSHI MOMOSE
Team Leader, Study Team
Japan Int'l. Cooperation Agency

The Stage I field work for "the Study on Provincial Water Supply, Sewerage and Sanitation Sector Plan" (hereinafter referred to as "the Study") started on August 31, 1994 and completed on December 28, 1994.

A series of discussions was held, through the course of the Study, between JICA Study Team and officials concerned including DILG, NEDA, DPWH, LWUA, other central agencies and provinces. General approach and methodologies, as presented in the Inception Report, have been employed for the planning work.

Progress Report I, which covers all outputs during the work period, was prepared entailing part of PW4SP for respective provinces. The contents of the report were basically agreed upon on December 20, 1994 between JICA Study Team and officials concerned in the Philippine side. The list of attendees to the meeting is presented in Appendix A. The following were confirmed and/or agreed upon by both parties.

1. Study Area Coverage

For Rizal province, four (4) municipalities covered by the MWSS were initially agreed to be excluded from the sector plan. However, inclusion of the Talim Island, part of Binangonan (rural area) which is one of the four municipalities, has been reconsidered upon request by the Governor.

2. Planning Conditions

(1) Table of Contents for PW4SP: referring to previous PW4SPs, some modifications were made.

(2) Planning Conditions:

- a. Conformity and consistency of the Study shall be ensured especially with "Medium-Term Philippine Development Plan 1993-1998."
- b. Planning base year is 1994, while target years are 2000 and 2010 for medium-term and long-term purposes, respectively. The start year of 5-year medium-term development is set to be 1996.

- c. Population projection: NSO projection was basically adopted. However, some modifications on urban and rural population by municipality were made with reference to re-classification of barangays reviewed by respective PSPTs.
- d. Data management: outputs in tables and graphics are prepared in EXCEL spreadsheets for final analysis and presentation.
- e. Sector arrangements and institutional capacity: previous arrangements adopted and experiences learned by the central government agencies are discussed in detail for reference/basis of LGUs in coming up with sector plan.

(3) Future Arrangements by DILG

- a. Further arrangements with PSPTs will be done by DILG to catch up with the schedule to complete PW4SP within one month during February, 1995 after holding workshop at respective provinces.
- b. Arrangements with Batch No. 2 provinces will be initiated based on the experience in Batch No. 1 study, ascertaining the peace and order in the provinces.
- c. To ensure timely completion/finalization of the Plans, DILG shall work closely with the LGUs and other agencies in getting the comments and recommendations on the Draft Plans.
- d. Adoption of the Plans by the Provincial Council (Sangguniang Panlalawigan) shall also be facilitated by DILG.

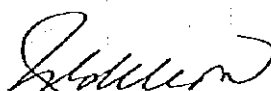
LIST OF ATTENDANTS

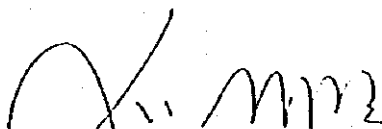
<u>Attendants</u>	<u>Designation</u>
A. DILG	
1. MR. ORVILLE M. ROQUE	Project Manager, PMO
2. MR. ROGELIO B. OCAMPO	Chief, Planning Div., PMO
3. MS. ELLEN I. PASCUA	Chief, Admin. Div., PMO
4. MR. MARIO VERGEL DE DIOS	Chief, Operations Div., PMO
5. MS. FE CRISILLA M. BANLUTA	PW4SP Overall Coordinator, PMO
6. MS. JOSEPHINE RAMOS	DILG Coordinator, Oriental Mindoro
7. MS. LINA GRIEGO	DILG Coordinator, Occidental Mindoro
8. MS. MA. CONTESSA NAVARRO	DILG Coordinator, Rizal
9. MS. VIVIAN BIALA	DILG Coordinator, Zambales
B. OTHER AGENCIES	
1. MR. ROGELIO FLORES	Director, PMO-RWS, DPWH
2. MR. VIRGILIO GACUSANA	Chief, Planning Division, PMO, DPWH
3. MR. VICTOR SABANDEJA	Chief, Environmental Health Division, DOH
4. MR. ANIANO FORNELOS JR.	Sanitary Engineer II, DOH
C. JICA	
1. MR. EIJI IWASAKI	Asst. Resident Representative, Philippine Office
D. JICA Study Team	
1. MR. MASATOSHI MOMOSE	Team Leader
2. MR. MASUOMI HIROYAMA	Water Supply Engineer
3. MS. YOLANDA M. MINGOA	Sanitary Engineer
4. MR. WILFRIDO C. BARREIRO	Institutional/CD/T Specialist
5. MR. ALLEN LOWE	System Engineer

MINUTES OF DISCUSSIONS
ON
THE PROGRESS REPORT II
FOR
STUDY ON PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN
IN
THE REPUBLIC OF THE PHILIPPINES

AGREED UPON BETWEEN
THE DEPARTMENT OF THE INTERIOR AND
LOCAL GOVERNMENT
AND
STUDY TEAM OF
JAPAN INTERNATIONAL COOPERATION AGENCY

MANILA, MARCH 8, 1995


HON. YOLANDA MA. L. DE LEON
Assistant Secretary
Dept. of the Interior and Local Government


MR. MASATOSHI MOMOSE
Team Leader, Study Team
Japan Int'l. Cooperation Agency

The Stage II field work for "the Study on Provincial Water Supply, Sewerage and Sanitation Sector Plan" (hereinafter referred to as "the Study") resumed on January 14, 1995 and completed on March 14, 1995.

Conditions and assumptions for development of Medium-Term and Long-Term sector plans were discussed and finalized between respective PSPTs and JICA Study Team through the conduct of Workshop No. 3.

Progress Report II, as a draft of PW4SP, was prepared. In this connection, contents of the report were basically agreed upon on March 8, 1995 between JICA Study Team and officials concerned in the Philippine side. The list of attendees to the meeting is presented in Appendix A.

The following are future arrangements required by both parties:

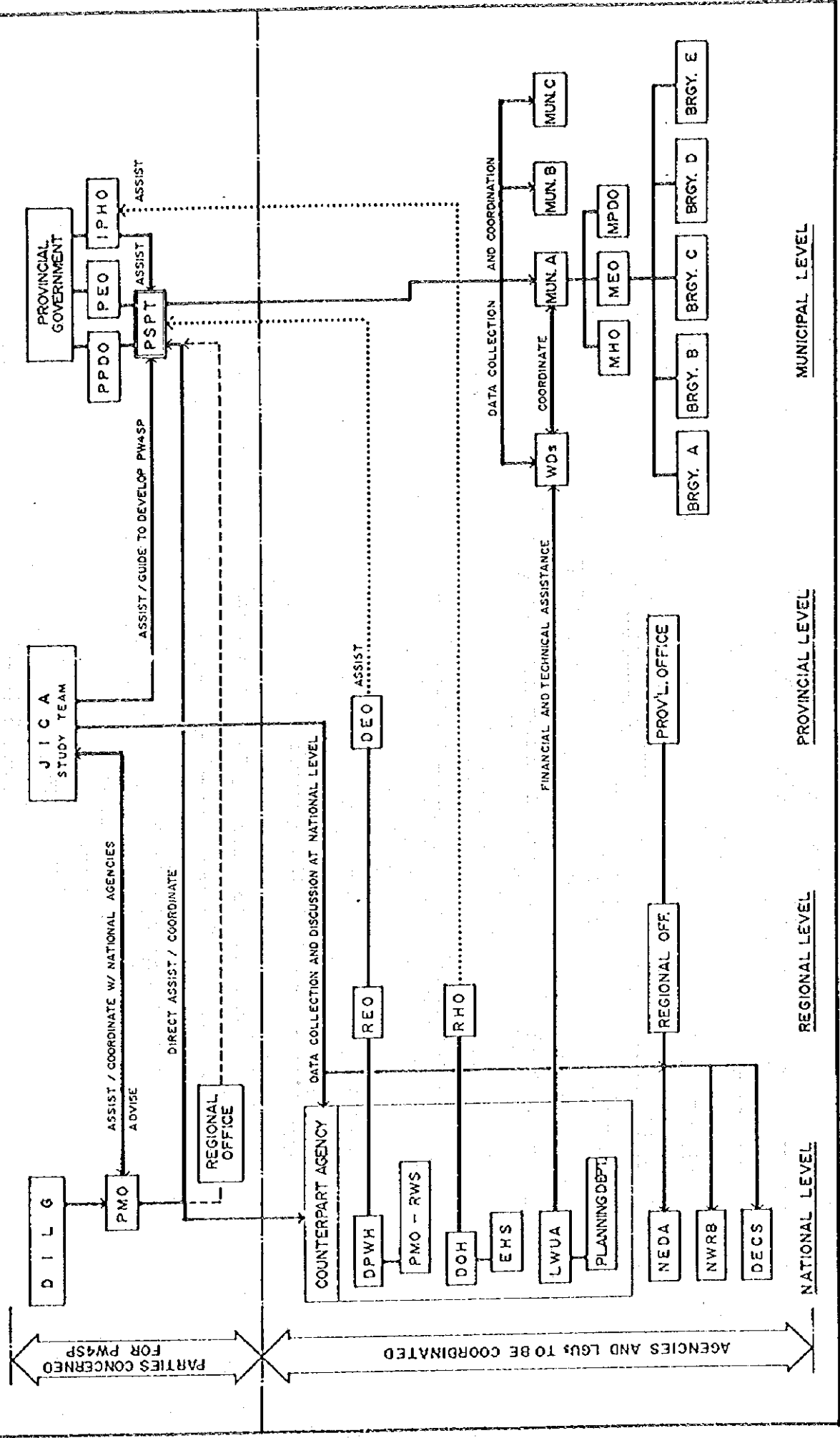
- (1) DILG will follow-up Batch No. 2 provinces for implementation of the PW4SPs, ascertaining the peace and order situation in the provinces.
- (2) The starting date of the third field work by JICA Study Team for Batch No. 2 will be informed to DILG through JICA Philippine Office.

Appendix A

LIST OF ATTENDEES

<u>Attendees</u>	<u>Designation</u>
A. DILG	
1. MR. ORVILLE M. ROQUE	Project Manager, PMO
2. MS. ELLEN I. PASCUA	Assistant Project Manager, PMO
3. MR. ROGELIO B. OCAMPO	Chief, Planning Div., PMO
4. MS. FE CRISILLA M. BANLUTA	PW4SP Overall Coordinator, PMO
5. MS. JOSEPHINE RAMOS	DILG Coordinator, Oriental Mindoro
6. MS. LINA GRIEGO	DILG Coordinator, Occidental Mindoro
7. MS. MA. CONTESSA NAVARRO	DILG Coordinator, Rizal
8. MS. VIVIAN BIALA	DILG Coordinator, Zambales
B. OTHER AGENCIES	
1. MR. VIRGILIO GACUSANA	Chief, Planning Division, PMO, DPWH
C. JICA	
1. MR. EIJI IWASAKI	Asst. Resident Representative, Philippine Office
2. MR. NOBUAKI MIYATA	Second Development Study Div., Social Development Study Dept.
D. JICA Study Team	
1. MR. MASATOSHI MOMOSE	Team Leader
2. MR. MASUOMI HIROYAMA	Water Supply Engineer
3. MS. YOLANDA M. MINGOA	Sanitary Engineer
4. MR. WILFREDO C. BARREIRO	Institutional/CD/T Specialist
5. MR. MANABU FUJIKAWA	Financial Specialist
6. MR. ALLEN LOWE	System Engineer

FIGURE 1.3.1
 ORGANIZATION CHART FOR IMPLEMENTATION OF PW4SP



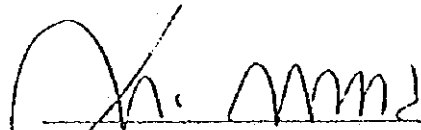
MINUTES OF DISCUSSIONS
ON
THE DRAFT FINAL REPORT
FOR
STUDY ON PROVINCIAL WATER SUPPLY, SEWERAGE AND
SANITATION SECTOR PLAN
IN
THE REPUBLIC OF THE PHILIPPINES

AGREED UPON BETWEEN
THE DEPARTMENT OF THE INTERIOR AND
LOCAL GOVERNMENT
AND
STUDY TEAM OF
JAPAN INTERNATIONAL COOPERATION AGENCY

MANILA, DECEMBER 7, 1995



HON. YOLANDA MA. L. DE LEON
Assistant Secretary
Dept. of the Interior and Local Government



MR. MASATOSHI MOMOSE
Team Leader, Study Team
Japan Int'l. Cooperation Agency

The Stage III field work for Batch II for "the Study on Provincial Water Supply, Sewerage and Sanitation Sector Plan" (hereinafter referred to as "the Study") started on May 22, 1995 and will be completed on December 15, 1995.

Major conditions and assumptions for the development of Medium-Term and Long Term sector plans for the remaining five (5) provinces under Batch II were discussed and finalized between respective PSPTs and JICA Study Team through the conduct of Workshop No. 3.

The Draft Final Reports for the nine (9) provinces, which cover all outputs during the study period, were prepared for respective provinces. The contents of the report were basically agreed upon on December 7, 1995 between JICA Study Team and officials concerned in the Philippine side. The list of attendees to the meeting is presented in Appendix A. The following were confirmed and/or agreed upon by both parties.

1. Correction of typographical errors of the Draft Final Report will be undertaken by the Study Team prior to printing of the Final Report.
2. Adoption of the Plans (Batch II) by the Provincial Council (Sangguniang Panlalawigan) shall be facilitated by DILG in the same manner as Batch I.
3. Inclusion of the Message of the Governor in the Main Report of respective PW4SPs.

~~10/27~~

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Appendix A

LIST OF ATTENDEES

<u>Attendees</u>	<u>Designation</u>
A. DILG	
1. HON. YOLANDA MA. L. DE LEON	Assistant Secretary
2. MR. ORVILLE M. ROQUE	Program Manager, PMO
3. MS. ELLEN I. PASCUA	Asst. Program Manager, PMO
4. MR. ROGER OCAMPO	Chief, Planning Div., PMO
5. MR. MARIO VERGEL DE DIOS	Chief, Operations Div., PMO
6. MS. FE CRISILLA M. BANLUTA	PW4SP Overall & Ilocos Norte Coordinator
7. MS. JOSEPHINE RAMOS	DILG Coordinator, Abra & Or. Mindoro
8. MS. LINA GRIEGO	DILG Coordinator, Batanes & Occ. Mindoro
9. MS. MA. CONTESSA NAVARRO	DILG Coordinator, Nueva Vizcaya & Rizal
10. MS. VIVIAN BIALA	DILG Coordinator, Ilocos Sur & Zambales
B. OTHER AGENCIES	
1. MR. ROGELIO A. FLORES	Director, PMO-RWS, DPWH
2. MR. VIRGILIO GACUSANA	Chief, Planning Division, PMO, DPWH
3. MR. VICTOR SABANDEJA	Chief, Environmental Health Division, DOH
4. MR. ANIANO FORNELOS JR.	Sanitary Engineer II, DOH
5. MR. JOSE RENE RONCESVALLES	Program Manager, LWUA
C. JICA	
1. MR. SHIGEYUKI MATSUMOTO	2nd Development Study Div., Social Development Study Dept.
D. JICA Study Team	
1. MR. MASATOSHI MOMOSE	Team Leader
2. MR. MASUOMI HIROYAMA	Water Supply Engineer
3. MS. YOLANDA M. MINGOA	Sanitary Engineer
4. MR. WILFRIDO C. BARREIRO	Institutional/CD/T Specialist
5. MR. ALLEN LOWE	System Engineer

2. **PLANNING APPROACH FOR FUTURE SECTOR DEVELOPMENT**
2.6 **Planning Principles and Data Management**
2.6.2 **Data Management**

(I) Computer-based System

The data management system was established to support the Provincial Sector Planning Team (PSPT) in the preparation of the Provincial Water Supply, Sewerage and Sanitation Sector Plan (PW4SP). An essential task of data management is to organize various kind of data into an effective and efficient information base.

A computer-based system was applied as a viable solution to process large amount of data and to minimize the human-error in calculation. For this particular project, a dynamic system is designed to allow the planner to adjust planning factors and update the information when further data becomes available.

It is viable and economical to choose the microcomputer with software suitable for the average skills of the common user. In this connection, of the two types of software package available, *database* and *spreadsheet*, the latter method was selected. Among the available spreadsheet-type software, EXCEL was used. EXCEL supports file conversion (opening and saving), multiple file opening, graphic presentation of data, What-You-See-Is-What-You-Get (WYSIWYG) formatting, scaleable font and view, etc. The following are the advantages and disadvantages of the spreadsheet method with reference to database method.

<u>Advantage</u>	<u>Disadvantage</u>
1. Minimum programming skills	1. Repeated entry of same formula
2. Friendly environment to users	2. Sorting or indexing is done manually
3. Graphic presentation of data at user's option	3. All data are loaded in memory, which require huge amount of memory
4. Execution of data linkage at formula level entry	4. Limited to static data linkages
5. Guided formula creation using function wizard	

Data management task starts from the collection of data using the questionnaire forms. The existence and accuracy of data are major concern at this stage to prepare main information bases. Using the microcomputer provided with EXCEL spreadsheet, data in the questionnaire forms are transferred into the forms constructed in EXCEL. Applicable policy, criteria and assumptions are entered into key parameter tables. These data are then processed and finally consolidated into target forms. These final forms provide a map of provincial profile, service coverage, future requirements, cost estimates for future sector development, and funding requirements.

Table 2.6.2 Key Parameter

No.	Description of Key Parameter		Unit	Values		
1.	Service Level	Water Supply Number of household to be served by Level I Facility Water Consumption Rate for Level III System	HP/Well Liter/capita/day			
		Sanitation Std. number of student to be served by a unit of sanitary toilet Standard number of toilets for a public utility	Student/Toilet Toilet/Public Facility			
2.	Provincial Sector Target	Medium Term Plan	Water Supply Urban Water Supply Rural Water Supply	% of Population % of Population		
			Sanitation Household Toilet <i>Urban Household Toilet</i> Flush Pour Flush VIP Latrine <i>Rural Household Toilet</i> Flush Pour Flush VIP Latrine School Toilet Public Toilet Solid Waste	% of Household % of Household % of Household % of Household % of Household % of Household % of Household % of Public Student % of Public Utility % of Urban Population		
				Long Term Plan Water Supply Urban Water Supply Rural Water Supply Sanitation Household Toilet <i>Urban Household Toilet</i> Flush Pour Flush VIP Latrine <i>Urban Household Toilet</i> Flush Pour Flush VIP Latrine School Toilet Public Toilet Urban Sewerage	% of Population % of Population % of Household % of Household % of Household % of Household % of Household % of Household % of Household % of Public Student % of Public Utility % of Urban Population	
		3.	Percentage of Level I Wells to be Rehabilitation		%	
		4.	Percentage of Sector Management Cost to Construction Cost			
			Feasibility and Detail Design Construction Supervision		% of Construction Cost % of Construction Cost	
		5.	Contingencies			
Physical Contingency Price Contingency			% of Construction Cost Percent per annum			
6.	Community Development and Training Cost					
	Level III Level I and II		% of Construction Cost % of Construction Cost			
7.	Recurrent Cost	Level III System (Operating Cost)	Pesos/HH/year			
		Level III System (Spare Parts/Equipment)	% of Construction Cost			
		Level II System (Spare Parts/Equipment)	Pesos/HH/year			
		Level I System (Spare Parts/Equipment)	Pesos/HH/year			
		Public School Toilet Maintenance Cost	Pesos/Toilet/year			
		Public Utility Toilet Maintenance Cost	Pesos/Toilet/year			
8.	Allocation factors/Percentages of IRA					
	From Provincial From Municipality and Brgy.		% %			
9.	Funding Levels/Percentages for Different Financing Scenarios					
	1st Scenario		% Funding Available			
	2nd Scenario		% Funding Available			
	3rd Scenario		% Funding Available			
	4th Scenario		% Funding Available			
	5th Scenario		% Funding Available			

Table 2.6.2 Composition of Well Sources and Specific Capacity

Municipality	Area	Source	Proportion (%)	Standard Specification		
				Depth (m)	SWL (m)	Specific Capacity (lit/sec/m)
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				
	Rural	Shallow Well				
		Deep Well				
	Urban	Shallow Well				
		Deep Well				

Table 2.6.5 Unit Construction Cost of Different Facilities

Description	Unit Construction Cost (Pesos)	Service Coverage		Unit Cost	
		Served Population	Served Household	Pesos/Person	Pesos/Household
Water Supply					
<i>Level III - New System</i>					
For 5000 Population					
For 10000 Population					
For 15000 Population					
<i>Level III - Expansion</i>					
For 5000 Population					
For 10000 Population					
For 15000 Population					
<i>Level II</i>					
<i>Level I</i>					
Deep Well - 30 meter depth					
Deep Well - 50 meter depth					
Deep Well - 70 meter depth					
Shallow Well					
Spring Development					
<i>Rehabilitation Cost for Level I Deep Well</i>					
<i>Disinfection of Level I Wells</i>					
Sanitation					
Flush					
Four Flush					
VIP Latrine					
School Toilet					
Public Toilet					
Urban Sewerage					

Table 2.6.6 Scoring Factor for Municipal Investment Ranking for Urban Water Supply

Unit: Percent

Score	Underserved and Uninserved Population in Base Year	Underserved and Uninserved Population in Phase I	Population Uninserved by Level III Systems in Base Year
1.0	< %	< %	< %
0.8	< % <	< % <	< % <
0.6	< % <	< % <	< % <
0.4	< % <	< % <	< % <
0.2	% <	% <	% <
Weight Allocation Score			

Table 2.6.7 Scoring Factor for Municipal Comprehensive Investment Ranking

Unit: Percent

Score	Urban Water Supply	Rural Water Supply	Urban Sanitation	Rural Sanitation
1.0	N.A.	< %	< %	< %
0.8	N.A.	< % <	< % <	< % <
0.6	N.A.	< % <	< % <	< % <
0.4	N.A.	< % <	< % <	< % <
0.2	N.A.	% <	% <	% <
Weight Allocation Score				

3. **PROVINCIAL PROFILE**
 3.3 **Socio-economic Conditions**
 3.3.1 **Economic Activities and Household Income**

Table 3.3.1 Distribution of Household by Income Class

Income Class	Occidental Mindoro				Region IV
	Total families		Annual Income		Average Annual Income
	Number	Share	Total (P 1,000)	Average (Pesos)	(Pesos)
Under 15,000	5,326	9.1	57,607	11,002	11,925
15,000 - 19,999	4,229	7.2	73,514	17,382	17,620
20,000 - 29,999	6,041	10.3	145,037	24,008	24,944
30,000 - 39,999	13,694	23.3	464,888	33,949	34,719
40,000 - 59,999	11,479	19.5	570,606	49,710	49,230
60,000 - 99,999	10,270	17.5	767,594	74,739	76,978
100,000 - 249,999	6,444	11.0	1,008,292	156,470	145,117
250,000 and over	1,410	2.4	507,202	359,794	437,341
Total	58,803	100.0	3,594,741	61,132	68,960
Median				40,019	47,552

Source: 1991 Family Income and Expenditures Survey, NSO

Notes:

- (1) Based on NEDA and other agencies, poverty threshold in Region IV in 1991 was estimated at P 51,486. Proportion of families below poverty level was 60% in the same year.
- (2) For purposes of the survey, a family is defined as a group of persons usually living together and composed of the head and other persons related to the head by blood, marriage or adoption. A single person living alone is considered as a separate family.

Table 3.3.2 Gainful Workers by Occupation Group and Major Industry Group

Major Occupation Group	Gainful Workers 15 Years Old and Over	MAJOR INDUSTRY GROUP				
		Agriculture, Fishery and Forestry	Mining and Quarrying	Manufacturing	Electricity, Gas and Water	Construction
Total	95,756	65,037	280	1,848	278	2,472
Officials of the Gov't. & Special Interest Org. Corp Exec, Managers, Managing Prop & Supervisors	1,193	58	-	61	-	31
Professionals	3,834	10	-	10	-	40
Technicians & Associated Professionals	993	21	-	-	39	10
Clerks	3,519	20	10	-	66	-
Service & Shop Market Sales Workers	3,073	41	-	-	-	10
Farmers, Forestry Workers & Fishermen	50,663	50,355	-	129	18	12
Craft and Related Workers	3,706	-	83	1,154	144	1,622
Plant & Machine Operators & Assemblers	3,112	60	30	239	11	43
Elementary Occupations	22,171	14,286	21	217	-	693
Other Occupations	1,679	186	136	38	-	11
Occupation Not Stated	1,813	-	-	-	-	-

Major Occupation Group	MAJOR INDUSTRY GROUP					
	Wholesale and Retail Trade	Transportation and Communication	Financing, Insurance, Real Estate and Business Services	Community, Social and Personal Services	Activities not adequately defined	Not Stated
Total	8,001	3,538	734	10,729	2,121	718
Officials of the Gov't. & Special Interest Org. Corp Exec, Managers, Managing Prop & Supervisors	421	49	30	525	18	-
Professionals	17	9	70	3,620	58	-
Technicians & Associated Professionals	57	114	155	581	16	-
Clerks	1,816	93	188	1,278	48	-
Service & Shop Market Sales Workers	1,596	120	269	978	59	-
Farmers, Forestry Workers & Fishermen	79	-	-	10	60	-
Craft and Related Workers	157	31	-	484	31	-
Plant & Machine Operators & Assemblers	-	2,511	-	207	11	-
Elementary Occupations	3,746	592	22	2,491	103	-
Other Occupations	112	19	-	555	622	-
Occupation Not Stated	-	-	-	-	1,095	718

Source: NSO Census 1990

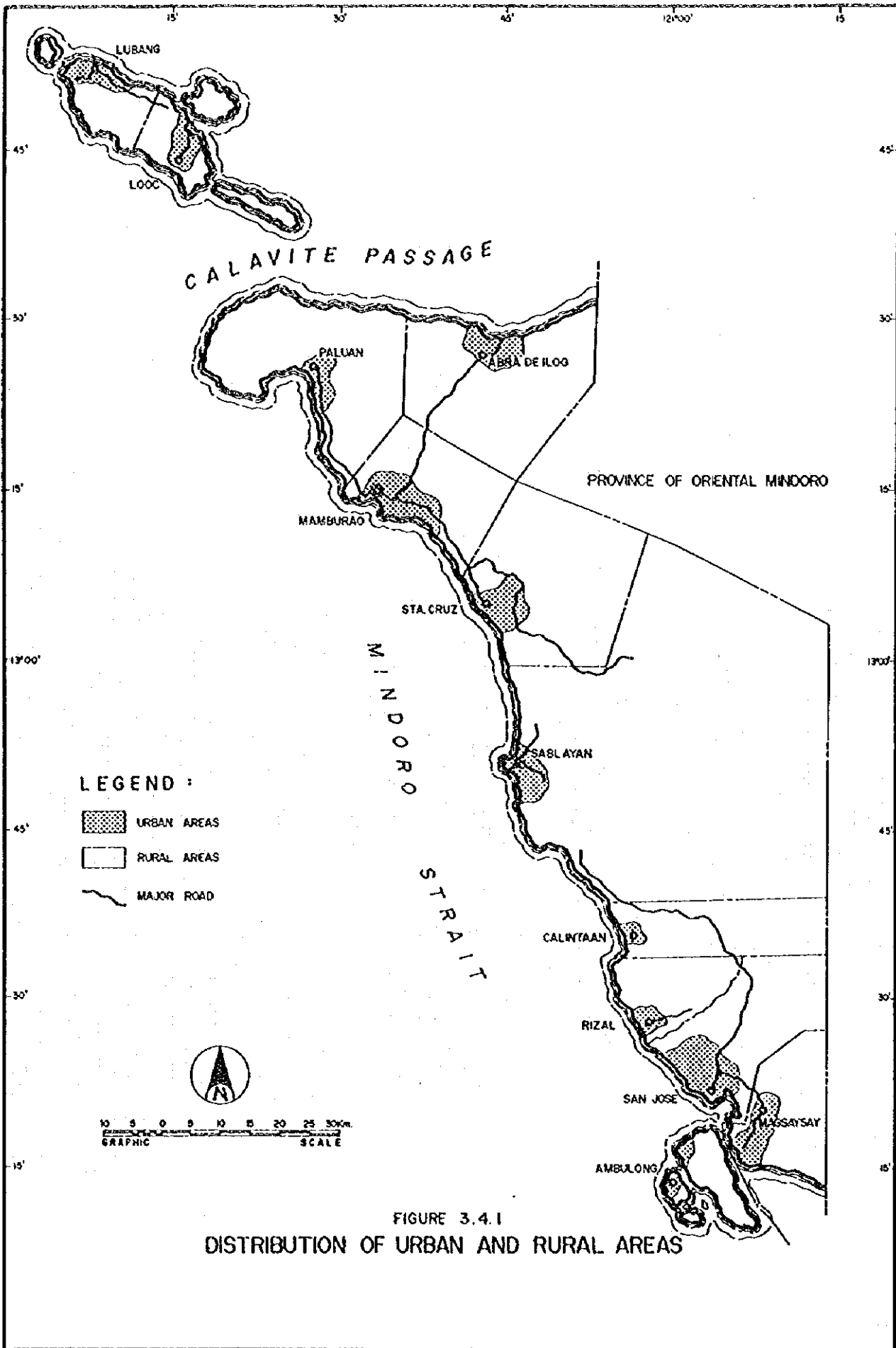
3.3.3 Education

Table 3.3.3 Household Population by Highest Educational Attainment

Highest Educational Attainment	Household Population 7 Years Old and Over	AGE GROUP						
		Below 20	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 & Over
Total	220,754	92,519	24,589	21,347	18,210	15,129	12,231	36,729
No Grade Completed	16,365	7,606	1,232	1,327	980	901	724	3,595
Pre-School	2,199	2,098	12	11	8	7	6	57
Elementary	129,650	59,880	9,099	8,807	9,438	8,648	7,770	26,008
1st - 4th Grade	65,215	39,172	2,870	2,702	2,780	2,698	2,567	12,426
5th - 7th Grade	64,435	20,708	6,229	6,105	6,658	5,950	5,203	13,582
High School	49,317	19,932	8,863	6,487	4,511	3,256	2,042	4,226
Undergraduate	29,830	15,314	4,455	3,078	2,135	1,602	1,070	2,176
Graduate	19,487	4,618	4,408	3,409	2,376	1,654	972	2,050
Post Secondary	3,359	318	922	766	525	318	166	344
Undergraduate	730	91	200	165	99	62	40	73
Graduate	2,629	227	722	601	426	256	126	271
College Undergraduate	11,856	2,533	3,026	2,130	1,509	957	663	1,038
Academic Degree Holder	7,740	48	1,400	1,797	1,211	1,027	842	1,415
Not Stated	268	104	35	22	28	15	18	46

Source: NSO Census 1990

3.4 Population
 3.4.2 Classification of Urban and Rural Areas



3.5 Health Status

3.5.3 Health Facilities and Practitioners

Table 3.5.1 Number and Ratio of Population to Health Facilities and/or Medical Practitioners

Health Facilities	Occidental Mindoro		Philippines	
	Number	Ratio	Number	Ratio
Hospitals	8	1:68756	1,733	1:35017
RHUs	11	1:50004	2,295	1:26442
BHSs	32	1:17189	10,151	1:5978
Practitioners				
Doctors	41	1:13416	7,431	1:8166
Nurses	75	1:7334	10,270	1:5909
Midwives	67	1:8210	11,604	1:5230
Dentists	13	1:42311	1,550	1:39152

3.6 Environmental Conditions

3.6.2 Water Pollution

Table 3.6.1 DENR Water Quality Criteria/Water Usage and Classification for Fresh Water

PARAMETER	UNIT	CLASS AA	CLASS A	CLASS B	CLASS C	CLASS D
Color	PCU	15	50	(C)	(C)	(C)
Temperature (max. rise in deg. Celsius)	°C rise	--	3	3	3	3
pH (range)		6.5-8.5	6.5-8.5	6.5-8.5	6.5-8.5	6.0-9.0
Dissolved Oxygen (Minimum)	% satn	70	70	70	60	40
	mg/L	5.0	5.0	5.0	5.0	3.0
5-Day 20°C BOD	mg/L	1	5	5	7(10)	10(15)
Total Suspended Solids	mg/L	25	50			
Total Dissolved Solids	mg/L	500	1,000	--	--	1,000
Surfactants (MBAS)	mg/L	nil	0.2(0.5)	0.3(0.5)	0.5	--
Oil/Grease (Petroleum Ether Extract)	mg/L	nil	1	1	2	5
Nitrate as Nitrogen	mg/L	1	10	NR	10	--
Phosphate as Phosphorous	mg/L	nil	0.1	0.2	0.4	--
Phenolic Substances as Phenols	mg/L	nil	0.002	0.005	0.02	--
Total Coliforms	MPN/100mL	50	1,000	1,000	5,000	--
or Fecal Coliforms	MPN/100mL	20	100	200	--	--
Chloride as Cl	mg/L	250	250	--	350	--
Copper	mg/L	1	1	--	0.05	--

Notes:

Class AA - Public Water Supply Class I. Intended for waters having watersheds which are uninhabited and otherwise protected and which require only approved disinfection in order to meet the national standards for drinking water.

Class A - Public Water Supply Class II. Sources of water supply that will require complete treatment (coagulation, sedimentation, filtration and disinfection) in order to meet drinking water standards.

Class B - Recreational Water Class I. For primary contact recreation such as bathing, swimming, skin diving, etc. (particularly for tourism purposes).

Class C - Fishery Water for the propagation and growth of fish and other aquatic resources; recreational (for boating, etc.); industrial water supply class I for manufacturing processes after treatment.

Class D - For agriculture, irrigation, livestock watering, etc.; for industrial water supply class II (cooling, etc.); other inland waters by their quality, belong to this specification.

4. EXISTING FACILITIES AND SERVICE COVERAGE

4.1 Water Supply

4.1.3 Level III Systems

Table 4.1.1 Details on Existing Level III Systems

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Level III Services								
			Number of Barangays Served			Number of Households Served			Number of Population Served		
			Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
045101	Abra de Ilog	Abra de Ilog WW	1	1	2	282	25	307	1,354	118	1,472
045104	Lubang	Lubang RWSA	7	1	8	529	346	875	2,328	1,695	4,023
		Tilik RWSA	1	0	1	319	0	319	1,403	0	1,403
		Municipal Total	8	1	9	848	346	1,194	3,731	1,695	5,426
045105	Magsaysay	San Jose WD	1	1	2	258	60	318	1,316	324	1,640
045106	Mamburao (Capital)	Mamburao RWSA	9	0	9	1,511	0	1,511	7,404	0	7,404
045109	Sablayan	Sablayan WD	3	1	4	1,000	35	1,035	5,300	178	5,478
045110	San Jose	San Jose WD	13	0	13	2,021	0	2,021	10,509	0	10,509
Provincial Total			35	4	39	5,920	466	6,386	29,614	2,315	31,929

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Level II Services								
			Number of Public Faucets			Number of Households Served			Number of Population Served		
			Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
045101	Abra de Ilog	Abra de Ilog WW	0	0	0	0	0	0	0	0	0
045104	Lubang	Lubang RWSA	0	0	0	0	0	0	0	0	0
		Tilik RWSA	0	0	0	0	0	0	0	0	0
		Municipal Total	0	0	0	0	0	0	0	0	0
045105	Magsaysay	San Jose WD	1	0	1	20	0	20	102	0	102
045106	Mamburao (Capital)	Mamburao RWSA	12	0	12	48	0	48	235	0	235
045109	Sablayan	Sablayan WD	0	0	0	0	0	0	0	0	0
045110	San Jose	San Jose WD	9	0	9	36	0	36	187	0	187
Provincial Total			22	0	22	104	0	104	524	0	524

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Water Sources			Consumption			
			Type ¹	Number	Production (cu.m/day)	Domestic	Institutional	Commercial	Industrial
									(cu. m/day)
045101	Abra de Ilog	Abra de Ilog WD	SP	1	173	99	0	0	0
045104	Lubang	Lubang RWSA	DgW	1	1,015	282	1	0	0
		Tilik RWSA	Surf	1	306	103	0	0	0
		Municipal Total		2	1,321	385	1	0	0
045105	Magsaysay	San Jose WD	DgW	1	864	226	0	0	0
045106	Mamburao (Capital)	Mamburao RWSA	DW	2	940	738.8	5.2	5.16	5
045109	Sablayan	Sablayan WD	SW	1	1,024	568	5	0	15
045110	San Jose	San Jose WD	DgW	7	6,739	1,463	0	290	0
Provincial Total				14	11,061	3,480	11	295	20

Note: 1. Type of Water Source; DW - Deep Well, DgW - Dug Well, Surf. - Surface Water (River), SP - Spring, IG - Infiltration Gallery.

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Consumers													
			Domestic House Connections				Domestic Public Faucets				Institutional		Commercial		Industrial	
			Connection		Consumption (cu.m/day)	Connection		Consumption (cu.m/day)	Connection		Consumption (cu.m/day)	Connection		Consumption (cu.m/day)		
			Metered	Un-metered		Metered	Un-metered		Metered	Un-metered		Metered	Un-metered			
045101	Abra de Ilog	Abra de Ilog WD	0	307	99.00	0	0	0	0	0	0	0	0	0	0	
045104	Lubang	Lubang RWSA	875	0	282.30	0	0	0	2	0	1.30	0	0	0	0	
		Tilik RWSA	0	319	102.90	0	0	0	0	0	0	0	0	0		
		Municipal Total	875	319	385.20	0	0	0	2	0	1.3	0	0	0		
045105	Magsaysay	San Jose WD	318	9	225.70	1	0	0.70	0	0	0	0	0	0		
045106	Mamburao (Capital)	Mamburao RWSA	1,511	0	731.10	12	0	7.70	8	0	5.20	8	0	5.20		
045109	Sablayan	Sablayan WD	1,035	0	567.58	0	0	0	5	0	4.84	0	0	14.5		
045110	San Jose	San Jose WD	2,021	0	1,447.30	9	0	15.29	0	0	0	165	0	289.63		
Provincial Total			5,760	635	3,455.88	22	0	23.69	15	8	11	173	0	294.73	23	

4.1.4 Level II Systems

Table 4.1.2 Existing Level II Systems

NEDA Geographic Code	Municipality	Name of System (Operating System)	Water Source		Existing Facilities					
					Length of Transmission Line (meter)	Reservoir		Length of Distribution Line (meter)	Number of Public Faucets	
			Type ¹	Number		Number	Q (cu.m)			
045101	Abra de Ilog	Missionaries (NGO)	SP	1	800	1	30	1,000	5	
045107	Paluan	Old poso	DW	1	200	1	60	3,000	42	
		Paluan Waterworks	SP	1	2,500	1	60	3,000	35	
		Municipal Total		2	2,700	2	120	6,000	77	
045109	Sabluyan	Yapang Waterworks	DW	1	198	1	30	2,460	22	
045110	San Jose	Municipal Gov't.	SP	1	1,000	1	60	1,500	10	
		Bunlao Waterworks	SP	1	750	1	60	1,000	3	
		Municipal Total		2	1,750	2	120	2,500	13	
Provincial Total					10	5,448	6	300	11,960	117

Note: 1. Type of Water Source; DW - Deep Well, Surf. - Surface Water (River), SP - Spring, IG - Infiltration Gallery.

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Number of Barangays Served			Number of Households Served			Number of Population Served		
			Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
045101	Abra de Ilog	Missionaries (NGO)	0	1	1	0	25	25	0	118	118
045107	Paluan	Old poso	6	0	6	210	0	210	1,008	0	1,008
		Paluan Waterworks	6	0	6	175	0	175	840	0	840
		Municipal Total	12	0	12	385	0	385	1,848	0	1,848
045109	Sabluyan	Yapang Waterworks	0	1	1	0	110	110	0	561	561
045110	San Jose	Municipal Gov't.	0	3	3	0	50	50	0	265	265
		Bunlao Waterworks	0	1	1	0	15	15	0	80	80
		Municipal Total	0	4	4	0	65	65	0	345	345
Provincial Total			12	6	18	385	200	585	1,848	1,024	2,872

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Service Conditions During Dry Season							Supply Water Pressure (% of Total)	
			Supply (Hrs/day)	Dirty Water ¹	Taste or Smell ²	Supply Interruption (number/month)				Adequate	Inadequate
						Power Failure	Pump Break-down	Pipe Burst	Others		
045101	Abra de Ilog	Missionaries (NGO)	24							95	5
045107	Paluan	Old poso	24		G					98	2
		Paluan Waterworks	24		G					80	20
045109	Sabluyan	Yapang Waterworks	12		G					95	5
045110	San Jose	Municipal Gov't.	24		G					80	20
		Bunlao Waterworks	24		G					66	33

Note: 1. Dirty Water; E - Everyday, OW - Once a week, OM - Once a month, O - Occasional
2. Taste/Smell; G - Good taste, S - Salty, W - Wood taste, M - Metallic taste, O - Others.

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Number of Staff					Repair Work		
			Technical Professional	Administrative Staff	Collector	Total Number of Staff	Local Trademan	MEO/CEO	DEO	
045101	Abra de Ilog	Missionaries (NGO)					NGO			
045107	Paluan	Old poso					NGO			
		Paluan Waterworks					NGO	TA		
045109	Sabluyan	Yapang Waterworks						PEO		
045110	San Jose	Municipal Gov't.							PG	
		Bunlao Waterworks							PG	

Note: TA - Technical assistance, PG - Provincial government.

Table 4.1.2 Existing Level II Systems

Sheet 2

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Expenditures							Tariff				Average Collection Efficiency (%)	
			Annual	Wages	Fuel, Chem, Mat'l	Transport	Repairs	Loan Repayment	Other	Consumer Payment	Cost per Gall	Cost per Cubic Meter	Cost Per Household		Other
			(Thousand of Pesos/year)							(Year)	(Pesos)				(%)
045101	Abra de Ilog						5								
045107	Paluan														
045109	Sablayan														
045110	San Jose														

NEDA Geographic Code	Municipality	Name of System (Operating Body)	Billings					Revenues					
			Annual Billing	Public Faucet Consumers	House Connection Consumers	Expected Subsidies	Others	Annual Income	Payment by Public Faucet Consumers	Payment by House Connection Consumer	Subsidies	Others	
			(Number)	(Thousand of Pesos/year)									
045101	Abra de Ilog	Missionaries (NGO)											
045107	Paluan	Old peso											
		Paluan Waterworks											
045109	Sablayan	Yapang Waterworks											
045110	San Jose	Municipal Gov't											
		Bunlaon Waterworks											

4.1.5 Level I Facilities

Safe and Unsafe Classification of Level I Facilities

The PHO conducted water quality analysis of samples collected from public and private Level I wells and classified into safe and unsafe sources/facilities as shown in Table 4.1.3.

Table 4.1.3 Percentage of Unsafe Water Sources by PHO

Municipality	No. of Existing Level I Sources	No. of Unsafe Sources	Percentage of Unsafe Sources
Abra de Ilog	478	478	100
Calintaan	2,191	438	20
Looc	141	141	100
Lubang	422	422	100
Magsaysay	915	782	85
Mamburao	2,117	1,990	94
Paluan	632	476	75
Rizal	1,255	251	20
Sablayan	3,831	1,066	28
San Jose	6,210	2,987	48
Sta. Cruz	1,452	991	68
Total	19,644	10,022	51

Source: PHO Inventory, 1991

The results of water quality analysis indicated that about 51% of existing wells in a provincial average were classified unsafe sources. Since the total number of shallow wells (25,926) occupied 99% of the total number of Level I wells (26,029) and the deep well is rarely exposed to contamination by seepage of wastewater, PHO analysis results (unsafe percentages) were applied to classify all shallow wells (drilled and driven) into safe and unsafe sources.

The unsafe percentage by municipality was applied common to urban and rural areas both for public and private shallow wells. While, those sources other than shallow wells were processed as classified in the questionnaire. Table 4.1.4 presents number of Level I facilities by safe and unsafe classification.

4.1.6 Water Supply Service Coverage

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

Through the quick review of the number of water supply systems/facilities and the number of households derived from questionnaire, it was found that a great number of unserved population would be figured out as a balance between the total population and population with any levels of services (including unsafe facilities) in application of the service level standard for Level I and II. To come up with more realistic service coverage, the unserved population in 1994 was prefixed referring to the profile in 1990 population census data, "Households by Main Source of Drinking Water and City/Municipality." Of the rest of the population those who are not served by Level III and/or II systems were considered to be covered by shared or own use of Level I facilities. The calculation procedure is as follows:

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

Table 4.1.4 Number of Level I Facilities by Safe and Unsafe Classification

NEDA Geographic Code	Municipality	Type	Safe Sources										Unsafe Sources							Grand Total		
			Public					Private					Public								Private	
			Deep Well	Shallow Well	Covered/Improved Dug Well	Developed Spring	Sub-total	Shallow Well	Total	Shallow Well	Open Dug Well	Undeveloped Spring	Sub-total	Shallow Well	Open Dug Well	Open Dug Well	Rain Water Collector	Sub-total	Total			
045201	Abra de Ilog	Urban	0	0	0	1	1	0	1	2	0	0	0	0	0	0	0	0	8	10	11	
		Rural	5	0	0	0	5	0	5	20	0	0	0	0	0	0	0	0	480	505	510	
		Total	5	0	0	1	6	0	6	22	0	0	0	0	0	0	0	0	488	515	521	
045202	Calintaan	Urban	1	3	0	0	4	411	415	1	103	0	0	0	0	0	0	0	246	251	251	
		Rural	14	14	0	0	28	982	1,010	3	246	0	0	0	0	0	0	0	349	355	355	
		Total	15	17	0	0	32	1,393	1,425	4	4	0	0	0	0	0	0	0	230	234	235	
045203	Looc	Urban	0	0	0	1	1	0	1	4	0	0	0	0	0	0	0	0	20	20	20	
		Rural	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	650	670	670	
		Total	0	0	0	1	1	0	1	24	0	0	0	0	0	0	0	0	880	904	905	
045204	Lubang	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	885	885	885	
		Rural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,600	1,600	1,600	
		Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,485	2,485	2,485	
045205	Magway	Urban	3	0	0	0	3	106	109	0	0	0	0	0	0	0	0	0	599	599	599	
		Rural	12	0	0	4	16	39	55	0	0	0	0	0	0	0	0	0	223	223	223	
		Total	15	0	0	4	19	145	164	0	0	0	0	0	0	0	0	0	822	822	822	
045206	Mamburao (Capital)	Urban	5	0	0	0	5	79	84	3	1,230	0	0	0	0	0	0	0	886	886	886	
		Rural	5	0	0	0	5	136	141	3	2,116	0	0	0	0	0	0	0	2,116	2,119	2,260	
		Total	10	0	0	0	10	215	225	6	3,346	0	0	0	0	0	0	0	1,611	1,611	1,611	
045207	Paluan	Urban	2	0	0	1	3	54	57	0	0	0	0	0	0	0	0	0	238	243	243	
		Rural	12	0	0	0	12	79	91	2	3	3	3	3	3	3	3	3	399	404	404	
		Total	14	0	0	1	15	133	148	2	0	0	0	0	0	0	0	0	0	0	0	
045208	Ruzal	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		Rural	10	14	0	0	24	954	978	4	0	0	0	0	0	0	0	0	239	246	246	
		Total	10	14	0	0	24	954	978	4	0	0	0	0	0	0	0	0	239	246	246	
045209	Sablayan	Urban	0	2	0	0	2	707	709	1	0	0	0	0	0	0	0	0	953	967	967	
		Rural	10	29	0	0	39	2,449	2,488	11	0	0	0	0	0	0	0	0	1,228	1,243	1,243	
		Total	10	31	0	0	41	3,156	3,197	12	0	0	0	0	0	0	0	0	666	666	666	
045210	San Jose	Urban	0	0	0	0	0	722	722	0	0	0	0	0	0	0	0	0	4,081	4,081	4,081	
		Rural	2	0	0	0	2	4,421	4,423	0	0	0	0	0	0	0	0	0	4,747	4,747	4,747	
		Total	2	0	0	0	2	5,143	5,145	0	0	0	0	0	0	0	0	0	8,828	8,828	8,828	
045211	Sta. Cruz	Urban	3	6	0	0	9	53	62	14	0	0	0	0	0	0	0	0	114	128	128	
		Rural	24	7	0	0	31	247	278	15	0	0	0	0	0	0	0	0	524	545	545	
		Total	27	13	0	0	40	300	340	29	0	0	0	0	0	0	0	0	638	673	673	
Provincial Total		Urban	14	11	0	3	28	2,132	2,160	25	0	0	0	0	0	0	0	0	4,271	4,296	4,296	
		Rural	89	64	0	4	157	9,228	9,385	75	0	0	0	0	0	0	0	0	10,120	10,217	10,217	
		Total	103	75	0	7	185	11,360	11,545	100	0	0	0	0	0	0	0	0	14,391	14,513	14,513	

Unserviced population and the population covered by Level I facilities are presented in Table 4.1.5. Table 4.1.6 presents overall population covered by Level I facilities and number of households.

Number of households per shared public/private facility ranges from 2 to 18 households, which are considered within the reasonable level, as more or less equivalent to the service level standard of Level I public facility (15 households/facility) and Level II system (5 household/public faucet).

Table 4.1.5 Estimation of Unserviced Population by Municipality

NEDA Geographic Code	Municipality	Type	Population and Household		Served Population			Unserviced Population			Population Covered by Level I Facilities	
			Number	HH Size	Level III	Level II	Total	Unserviced Percentage (1990)				
								Total No. of HHs	Number of Unserviced HHs	%		
045201	Alra de Hog	Urban	1,733	4.8	1,354	0	1,354	347	4	1	20	359
		Rural	11,894	4.7	118	118	236	2,542	635	25	2,971	8,687
		Total	13,627	4.7	1,472	118	1,590	2,889	639	22	2,991	9,046
045202	Calintaan	Urban	6,024	5.5				966	2	0	12	6,042
		Rural	13,763	5.2				2,464	278	11	1,553	12,210
		Total	19,787	5.3				3,430	280	8	1,565	18,222
045203	Looc	Urban	2,511	4.3				388	0	0	0	2,511
		Rural	4,836	4.8				1,105	37	3	162	4,674
		Total	7,347	4.6				1,493	37	3	162	7,185
045204	Lubang	Urban	6,245	4.4	3,731		3,731	1,313	1	0	5	2,509
		Rural	14,292	4.9	1,695		1,695	2,685	174	7	926	11,671
		Total	20,537	4.7	5,426		5,426	3,998	175	4	931	14,180
045205	Magsaysay	Urban	7,346	5.1	1,316	102	1,418	1,293	4	0	23	5,905
		Rural	16,247	5.4	324	0	324	2,800	601	22	3,437	12,436
		Total	23,593	5.3	1,640	102	1,742	4,093	605	15	3,510	18,341
045206	Mamburao (Capital)	Urban	12,287	4.9	7,404	235	7,639	2,321	1	0	5	4,643
		Rural	12,141	5.1	0	0	0	2,029	186	9	1,113	11,028
		Total	24,428	5.0	7,404	235	7,639	4,350	187	4	1,118	15,671
045207	Pahang	Urban	3,866	4.8		1,848	1,848	660	2	0	12	2,006
		Rural	4,045	4.6		0	0	946	326	35	1,394	2,651
		Total	7,911	4.7		1,848	1,848	1,615	328	20	1,406	4,657
045208	Rizal	Urban	0	0.0				0	1	0	0	0
		Rural	25,819	5.2				4,468	140	3	809	25,010
		Total	25,819	5.2				4,468	141	3	809	25,010
045209	Sablayan	Urban	12,654	5.3	5,300	0	5,300	1,848	6	0	41	7,313
		Rural	38,874	5.1	178	561	739	7,190	993	14	5,369	32,766
		Total	51,528	5.1	5,478	561	6,039	9,038	999	11	5,410	40,079
045210	San Jose	Urban	34,212	5.2	10,509	187	10,696	5,966	7	0	40	23,476
		Rural	63,208	5.3	0	345	345	10,698	1,089	10	6,434	56,429
		Total	97,420	5.3	10,509	532	11,041	16,664	1,096	7	6,474	79,905
045211	Sta. Cruz	Urban	3,267	5.6				462	1	0	7	3,260
		Rural	15,183	5.3				2,676	166	6	942	14,241
		Total	18,450	5.4				3,138	167	5	949	17,501
Provincial Total		Urban	90,145	5.1	29,614	2,372	31,986	15,533	29	0	165	57,994
		Rural	220,302	5.2	2,315	1,024	3,339	39,603	4,625	12	25,160	191,803
		Total	310,447	5.1	31,929	3,396	35,325	55,136	4,654	8	25,325	249,797

Table 4.1.6 Estimation of Population Covered by Safe and Unsafe Source by Municipality

Sheet 1

NEDA Geographic Code	Municipality	Type	Pop. Covered by Level I Facilities	Number of Facilities						Coverage of Own Use					
				Public Facilities			Private Facilities			Number of Private Facilities			(1) Population Covered		
				Safe	Unsafe	Total	Safe	Unsafe	Total	Safe	Unsafe	Total	Safe	Unsafe	Total
045201	Abra de Ilog	Urban	359	1	2	3	0	8	8	0	4	4	0	19	19
		Rural	8,687	5	25	30	0	480	480	0	240	240	0	1,128	1,128
		Total	9,046	6	27	33	0	488	488	0	244	244	0	1,147	1,147
045202	Cabitanan	Urban	6,912	4	1	5	411	103	514	206	52	258	1,133	285	1,419
		Rural	12,210	28	5	33	982	246	1,228	491	123	614	2,553	640	3,193
		Total	18,222	32	6	38	1,393	349	1,742	697	175	872	3,686	925	4,612
045203	Looc	Urban	2,511	1	4	5	0	230	230	0	115	115	0	495	495
		Rural	4,674	0	20	20	0	650	650	0	325	325	0	1,560	1,560
		Total	7,185	1	24	25	0	880	880	0	440	440	0	2,055	2,055
045204	Luhang	Urban	2,509	0	0	0	0	885	885	0	443	443	0	1,949	1,949
		Rural	11,671	0	0	0	0	1,600	1,600	0	800	800	0	3,920	3,920
		Total	14,180	0	0	0	0	2,485	2,485	0	1,243	1,243	0	5,869	5,869
045205	Magsaysay	Urban	5,905	3	0	3	106	599	705	53	300	353	270	1,530	1,800
		Rural	12,436	16	0	16	39	223	262	20	112	132	108	605	713
		Total	18,341	19	0	19	145	822	967	73	412	485	378	2,135	2,513
045206	Mamburao (Capital)	Urban	4,643	5	3	8	79	1,236	1,309	40	615	655	196	3,014	3,210
		Rural	11,028	0	0	0	57	886	943	29	443	472	148	2,259	2,407
		Total	15,671	5	3	8	136	2,116	2,252	69	1,058	1,127	344	5,273	5,617
045207	Paluan	Urban	2,006	3	0	3	54	161	215	27	81	108	130	389	519
		Rural	2,651	12	5	17	79	238	317	40	119	159	184	547	731
		Total	4,657	15	5	20	133	399	532	67	200	267	314	936	1,250
045208	Rizal	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
		Rural	25,010	24	7	31	954	239	1,193	477	120	597	2,430	624	3,104
		Total	25,010	24	7	31	954	239	1,193	477	120	597	2,430	624	3,104
045209	Sablayan	Urban	7,313	2	1	3	707	275	982	354	138	492	1,876	731	2,607
		Rural	32,766	39	14	53	2,449	953	3,402	1,225	473	1,702	6,248	2,433	8,681
		Total	40,079	41	15	56	3,156	1,228	4,384	1,579	615	2,194	8,124	3,164	11,288
045210	San Jose	Urban	23,476	0	0	0	722	666	1,388	361	333	694	1,877	1,732	3,609
		Rural	56,429	2	0	2	4,421	4,081	8,502	2,211	2,041	4,252	11,718	10,817	22,535
		Total	79,905	2	0	2	5,143	4,747	9,890	2,572	2,374	4,946	13,595	12,549	26,144
045211	Sta. Cruz	Urban	3,260	9	14	23	53	114	167	27	57	84	151	319	470
		Rural	14,241	31	21	52	247	524	771	124	262	386	657	1,389	2,046
		Total	17,501	40	35	75	300	638	938	151	319	470	808	1,708	2,516
Provincial Total	Urban	57,994	28	25	53	2,132	4,271	6,403	1,068	2,138	3,206	5,633	10,464	16,097	
	Rural	191,803	152	97	254	9,228	10,120	19,348	4,617	5,062	9,679	24,096	25,922	50,018	
	Total	249,797	185	122	307	11,360	14,391	25,751	5,685	7,200	12,885	29,729	36,386	66,115	

Table 4.1.6 Estimation of Population Covered by Safe and Unsafe Source by Municipality

Sheet 2

NEDA Geographic Code	Municipality	Type	Coverage of Shared Well						Level 1 Coverage (1) + (2)						
			(2) Population Covered by Public and Private			Number of Households			No. of Hhs per Shared Facility	Safe		Unsafe		Total	
			Safe	Unsafe	Total	Safe	Unsafe	Total		Pop.	%	Pop.	%	Pop.	%
045201	Abra de Ilog	Urban	49	291	340	19	61	71	18.0	49	3	310	18	359	21
		Rural	140	7,419	7,559	30	1,579	1,609	7.0	140	1	8,547	72	8,687	73
		Total	189	7,710	7,899	40	1,640	1,680	7.0	189	1	8,857	65	9,046	66
045202	Calintaan	Urban	3,673	920	4,593	668	167	835	3.0	4,806	80	1,206	20	6,012	100
		Rural	7,233	1,784	9,017	1,391	343	1,734	3.0	9,786	71	2,424	18	12,210	89
		Total	10,906	2,704	13,610	2,059	510	2,569	3.0	14,592	74	3,630	18	18,222	92
045203	Looc	Urban	17	1,999	2,016	4	465	469	4.0	17	1	2,404	99	2,511	100
		Rural	0	3,114	3,114	0	649	649	2.0	0	0	4,674	97	4,674	97
		Total	17	5,113	5,130	4	1,114	1,118	3.0	17	0	7,168	98	7,185	98
045204	Lubang	Urban	0	560	560	0	127	127	0.0	0	0	2,509	40	2,509	40
		Rural	0	7,751	7,751	0	1,582	1,582	2.0	0	0	11,671	82	11,671	82
		Total	0	8,311	8,311	0	1,709	1,709	1.0	0	0	14,180	69	14,180	69
045205	Magsaysay	Urban	647	3,458	4,105	127	678	805	2.0	917	12	4,988	68	5,905	80
		Rural	2,831	8,892	11,723	524	1,647	2,171	16.0	2,939	18	9,497	58	12,436	77
		Total	3,478	12,350	15,828	651	2,325	2,976	6.0	3,856	16	14,485	61	18,341	78
045206	Mamburao (Capital)	Urban	96	1,337	1,433	20	273	293	0.0	292	2	4,351	35	4,643	38
		Rural	521	8,100	8,621	102	1,588	1,690	4.0	669	6	10,359	85	11,028	91
		Total	617	9,437	10,054	122	1,861	1,983	2.0	961	4	14,710	60	15,671	64
045207	Paluan	Urban	404	1,083	1,487	84	226	310	3.0	534	14	1,472	38	2,006	52
		Rural	563	1,357	1,920	122	295	417	3.0	747	18	1,904	47	2,651	66
		Total	967	2,440	3,407	206	521	727	3.0	1,281	16	3,376	43	4,657	59
045208	Rizal	Urban	0	0	0	0	0	0	0.0	0	0	0	0	0	0
		Rural	17,490	4,416	21,906	3,363	849	4,212	7.0	19,970	77	5,040	20	25,010	97
		Total	17,490	4,416	21,906	3,363	849	4,212	7.0	19,970	77	5,040	20	25,010	97
045209	Sablayan	Urban	3,387	1,319	4,706	639	249	888	2.0	5,263	42	2,050	16	7,313	58
		Rural	17,350	6,735	24,085	3,402	1,321	4,723	3.0	23,598	61	9,168	24	32,766	84
		Total	20,737	8,054	28,791	4,041	1,570	5,611	3.0	28,861	56	11,218	22	40,079	78
045210	San Jose	Urban	10,334	9,533	19,867	1,987	1,833	3,820	6.0	12,211	36	11,265	33	23,476	69
		Rural	17,632	16,262	33,894	3,327	3,068	6,395	2.0	29,350	46	27,079	43	56,429	89
		Total	27,966	25,795	53,761	5,314	4,901	10,215	2.0	41,561	43	38,344	39	79,905	80
045211	Sta. Cruz	Urban	930	1,860	2,790	166	332	498	6.0	1,081	33	2,179	67	3,260	100
		Rural	4,307	7,888	12,195	813	1,438	2,301	6.0	4,964	33	9,277	61	14,241	94
		Total	5,237	9,748	14,985	979	1,820	2,799	6.0	6,045	33	11,456	62	17,501	96
Provincial Total	Urban	19,537	22,360	41,897	3,705	4,411	8,116	3.0	25,170	28	32,824	36	57,994	64	
	Rural	68,067	73,718	141,785	13,074	14,499	27,483	3.0	92,163	42	99,640	45	191,803	87	
	Total	87,604	96,078	183,682	16,779	18,820	35,599	3.0	117,333	38	132,464	43	249,797	80	

4.2 Sanitation and Sewerage

4.2.2 Types of Facilities and Definition of Service Level Standard

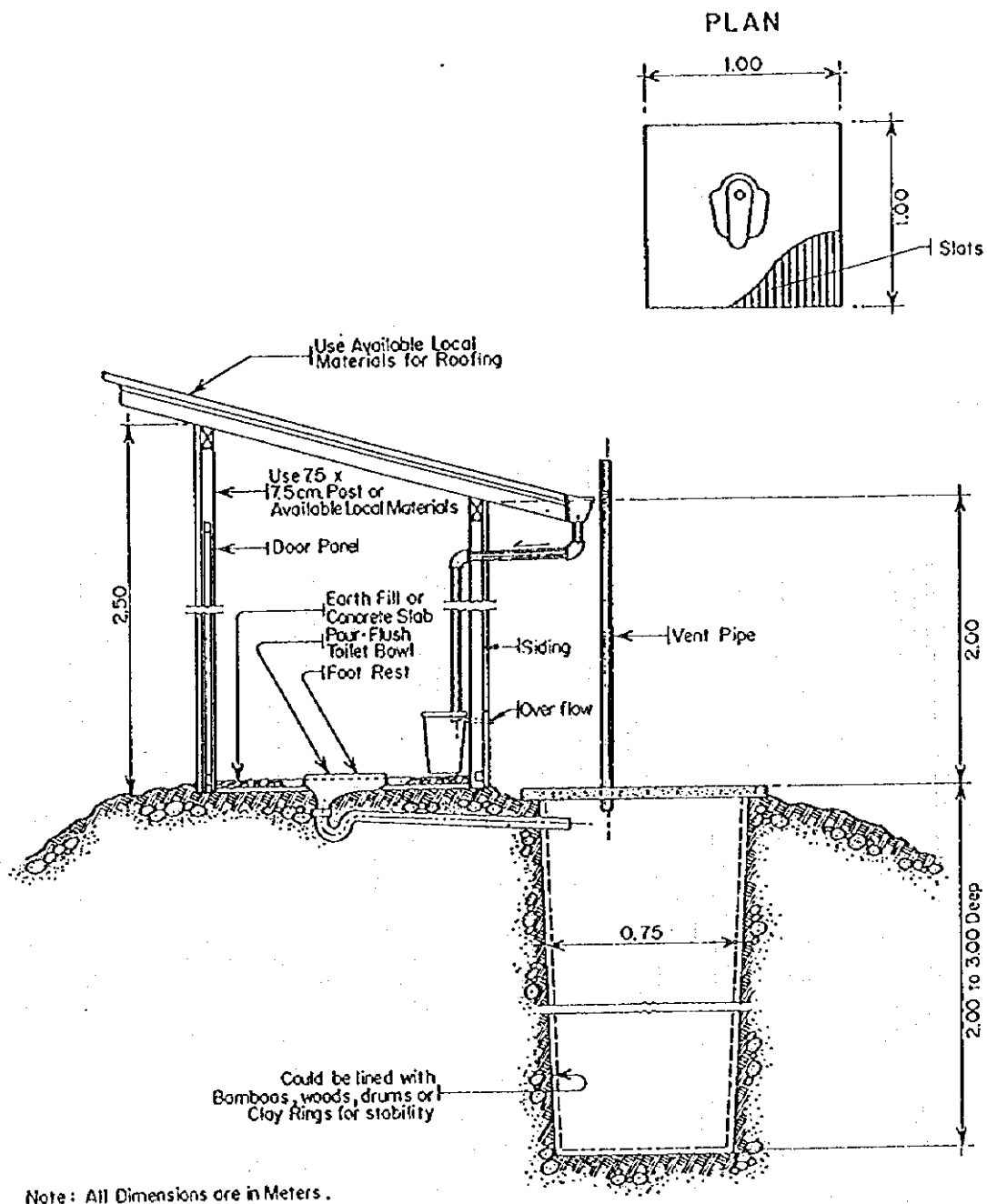
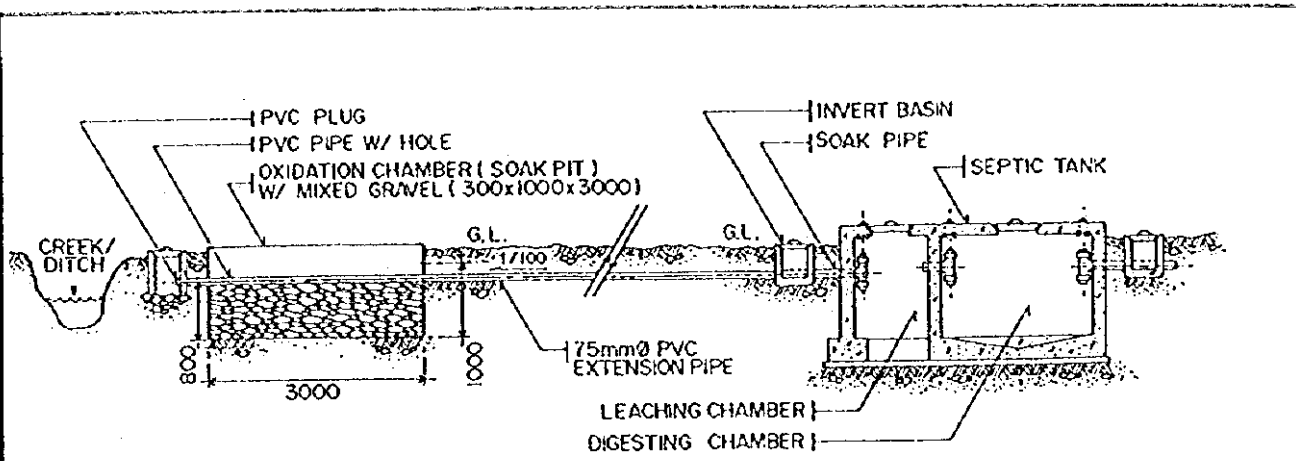


FIGURE 4.2.1
STANDARD STRUCTURE OF HOUSEHOLD TOILET FACILITY



LAYOUT PLAN OF HIGH GROUND WATER SITE

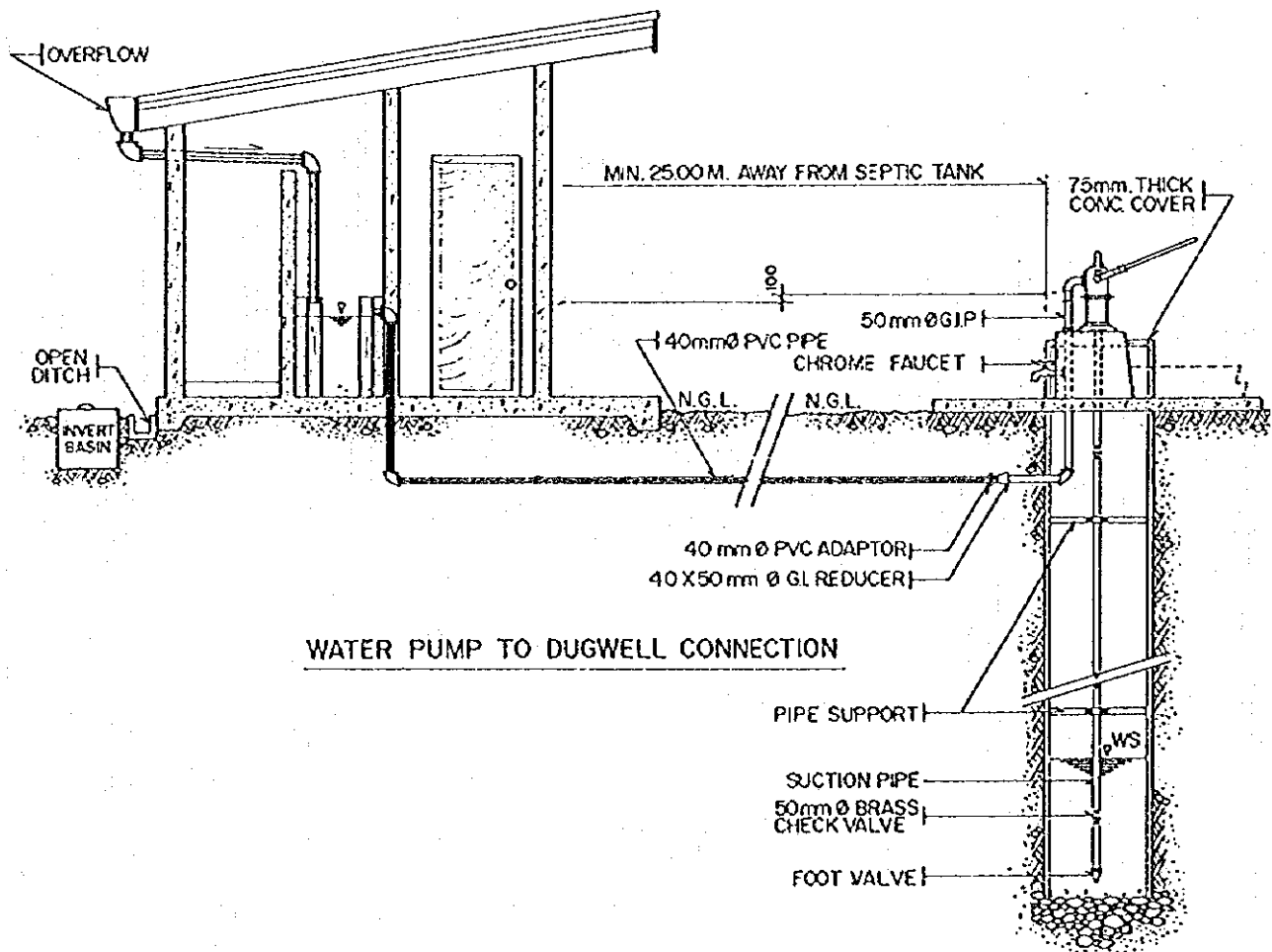
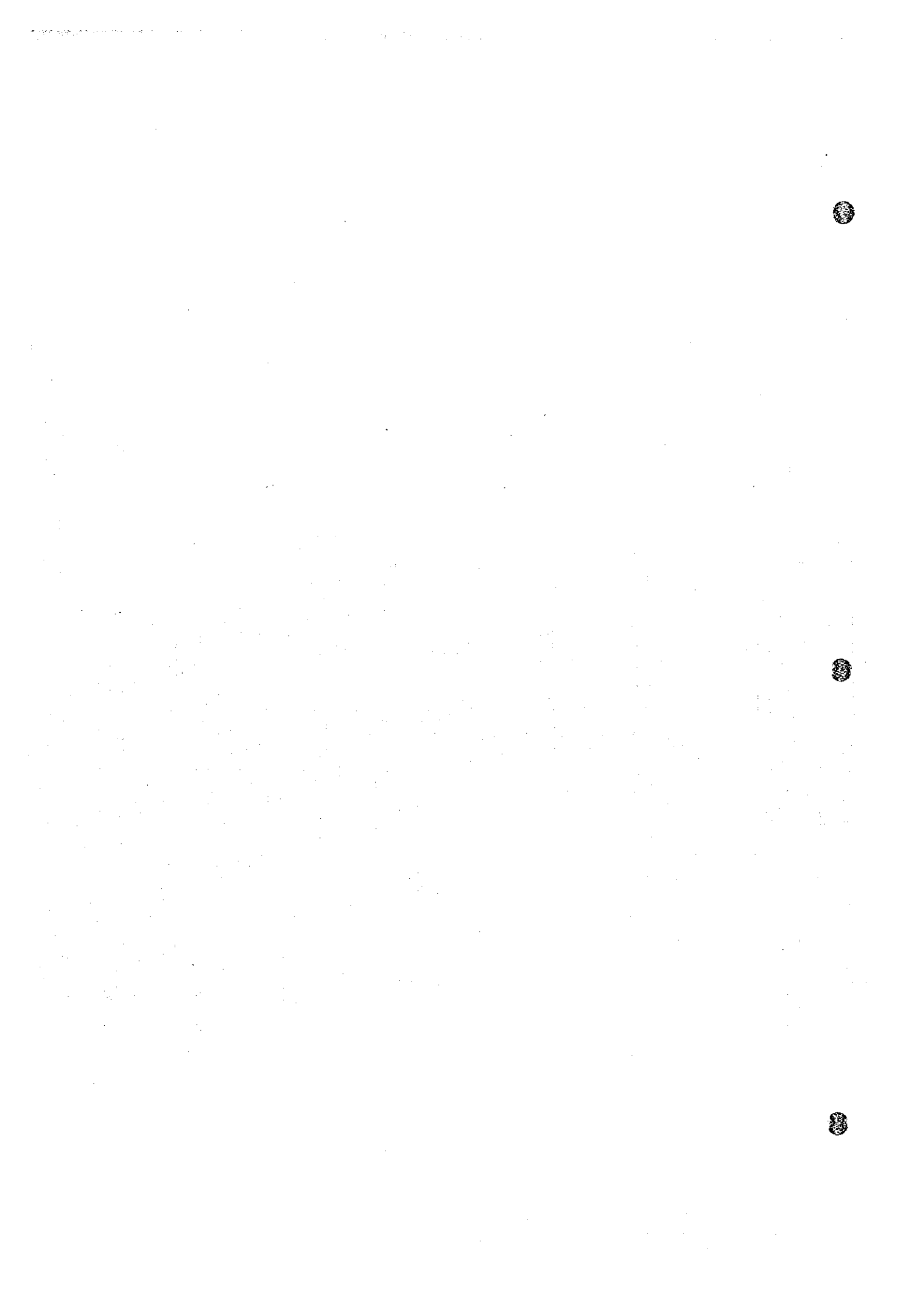


FIGURE 4.2.2
STANDARD STRUCTURE OF SCHOOL TOILET FACILITY

4.2.3 Sanitation Facilities and Service Coverage

Table 4.2.1 Sanitation Facilities and Service Coverage of Household Toilets by Type, by Municipality, Urban and Rural, 1994

Municipality	Type	HHs No. 1994	Households Served by Sanitary Toilets								Underserved/Unservd HHs			
			Flush Toilet		Pour Flush		VIP		Total		Unsanitary		No Facility	
			Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Abra de Ilog	Urban	361	141	39	144	40	0	0	285	79	63	17	13	4
	Rural	2,531	13	1	838	0	0	0	851	1	818	32	862	34
	Total	2,892	154	5	982	34	0	0	1,136	39	881	30	875	30
Calintaan	Urban	1,095	0	0	711	65	0	0	711	65	223	20	161	15
	Rural	2,647	0	0	1,880	71	0	0	1,880	71	396	15	371	14
	Total	3,742	0	0	2,591	69	0	0	2,591	69	619	17	532	14
Looc	Urban	584	0	0	335	57	0	0	335	57	217	37	32	5
	Rural	1,008	0	0	789	78	0	0	789	78	50	5	169	17
	Total	1,592	0	0	1,124	71	0	0	1,124	71	267	17	201	13
Lubang	Urban	1,419	424	30	575	41	0	0	999	70	64	5	356	25
	Rural	2,917	173	6	1,559	53	0	0	1,732	59	586	20	599	21
	Total	4,336	597	14	2,134	49	0	0	2,731	63	650	15	955	22
Magsaysay	Urban	1,440	129	9	1,158	80	0	0	1,287	89	153	11	0	0
	Rural	3,009	30	1	1,658	0	0	0	1,688	1	531	18	790	26
	Total	4,449	159	4	2,816	63	0	0	2,975	67	684	15	790	18
Mamburao (Capital)	Urban	2,508	755	30	775	31	0	0	1,530	61	170	7	808	32
	Rural	2,381	0	0	936	39	0	0	936	39	85	4	1,360	57
	Total	4,889	755	15	1,711	35	0	0	2,466	50	255	5	2,168	44
Paluan	Urban	805	0	0	148	18	285	35	433	54	285	35	87	11
	Rural	879	0	0	0	0	141	16	141	16	333	38	405	46
	Total	1,684	0	0	148	9	426	25	574	34	618	37	492	29
Rizal	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	4,965	0	0	2,654	0	0	0	2,654	0	1,537	31	774	16
	Total	4,965	0	0	2,654	53	0	0	2,654	53	1,537	31	774	16
Sablayan	Urban	2,388	500	21	883	37	0	0	1,383	58	481	20	524	22
	Rural	7,622	18	0	4,595	0	0	0	4,613	0	2,616	34	393	5
	Total	10,010	518	5	5,478	55	0	0	5,996	60	3,097	31	917	9
San Jose	Urban	6,579	1,010	15	3,864	59	0	0	4,874	74	800	12	905	14
	Rural	11,926	0	0	8,598	72	0	0	8,598	72	2,174	18	1,154	10
	Total	18,505	1,010	5	12,462	67	0	0	13,472	73	2,974	16	2,059	11
Sta. Cruz	Urban	583	0	0	394	68	0	0	394	68	98	17	91	16
	Rural	2,865	0	0	1,007	35	645	23	1,652	58	464	16	749	26
	Total	3,448	0	0	1,401	41	645	19	2,046	59	562	16	840	24
Provincial Total	Urban	17,762	2,959	17	8,987	51	285	2	12,231	69	2,554	14	2,977	17
	Rural	42,750	234	1	24,514	57	786	2	25,534	60	9,590	22	7,626	18
	Total	60,512	3,193	5	33,501	55	1,071	2	37,765	62	12,144	20	10,603	18



5. EXISTING SECTOR ARRANGEMENTS AND INSTITUTIONAL CAPACITY
 5.5 Sector Agencies at the Local Level

FIGURE 5.5.1
 ORGANIZATIONAL CHART
 PROVINCIAL PLANNING AND DEVELOPMENT OFFICE
 PROVINCE OF OCCIDENTAL MINDORO

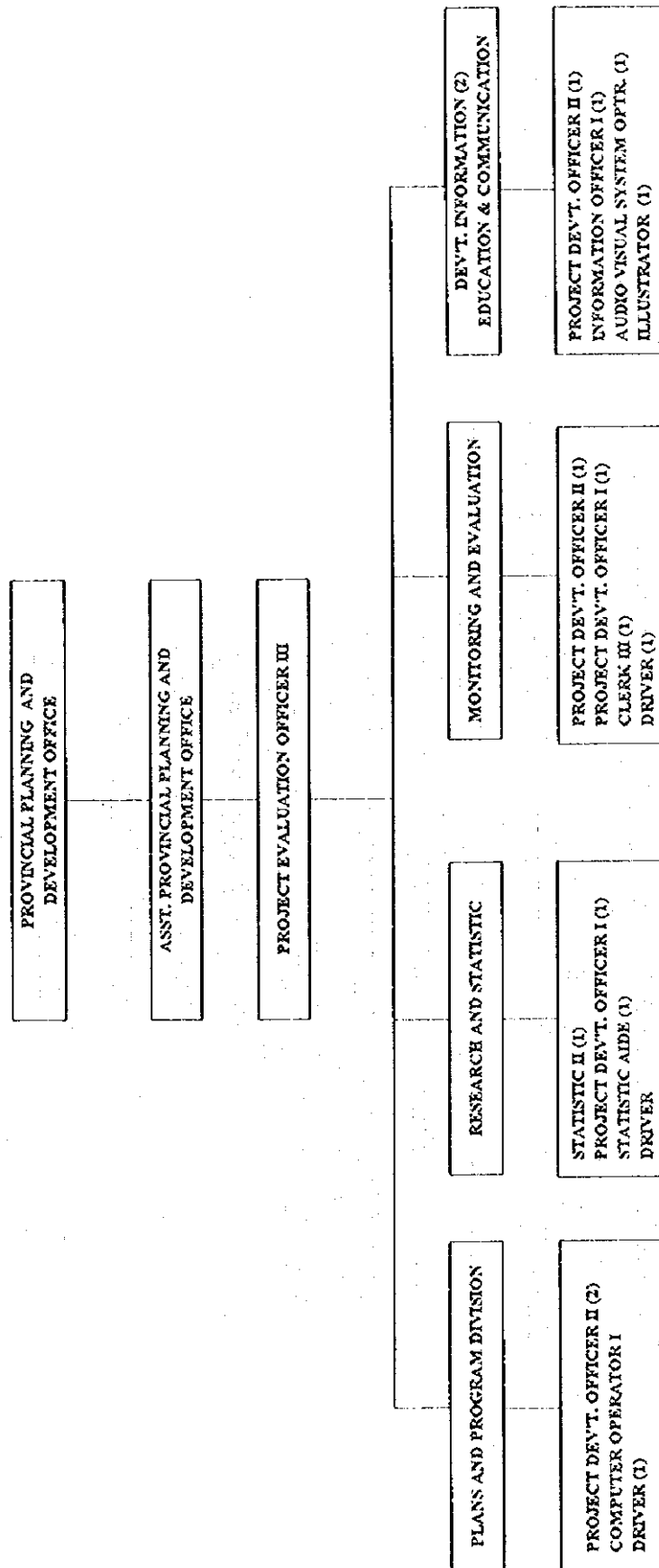


FIGURE S.5.2
 ORGANIZATIONAL CHART
 PROVINCIAL ENGINEER'S OFFICE
 OCCIDENTAL MINDORO

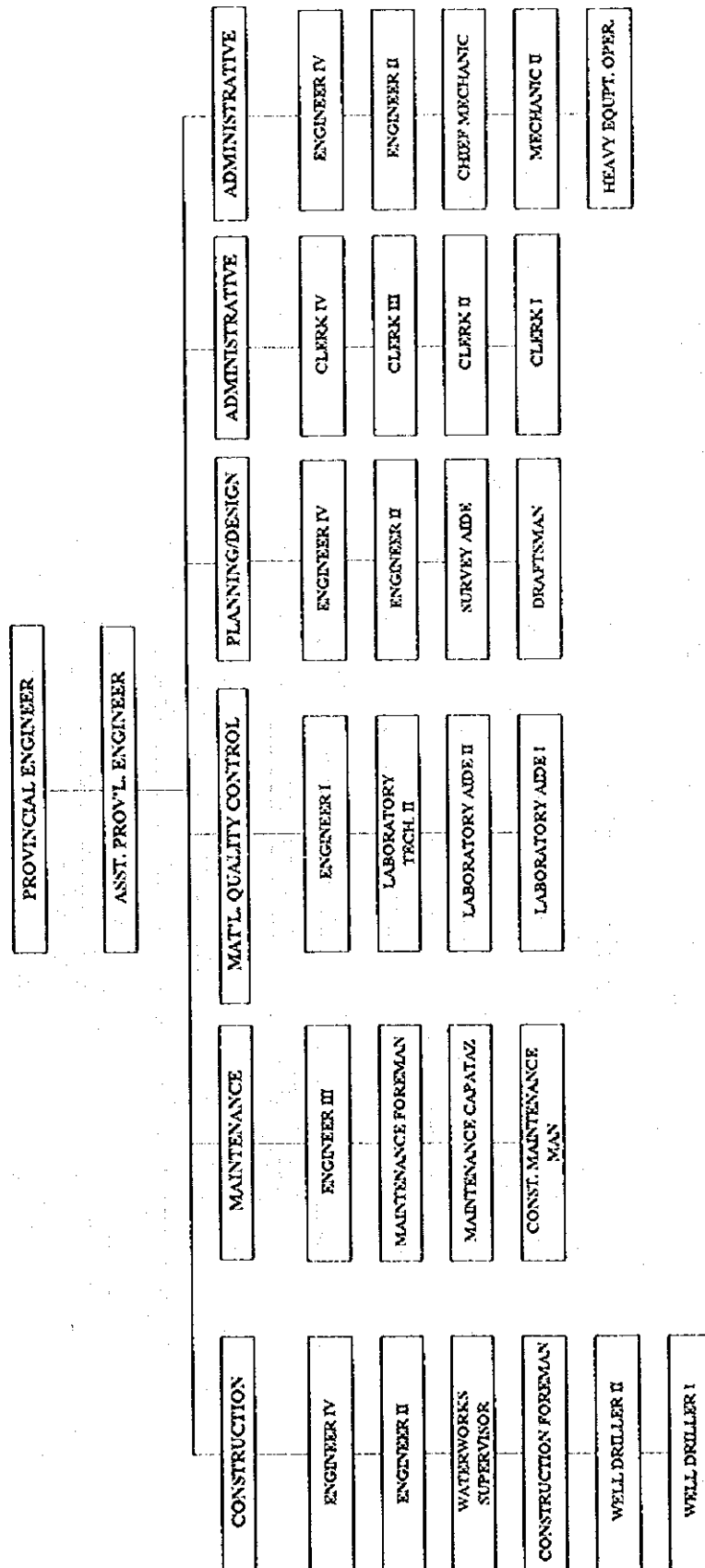
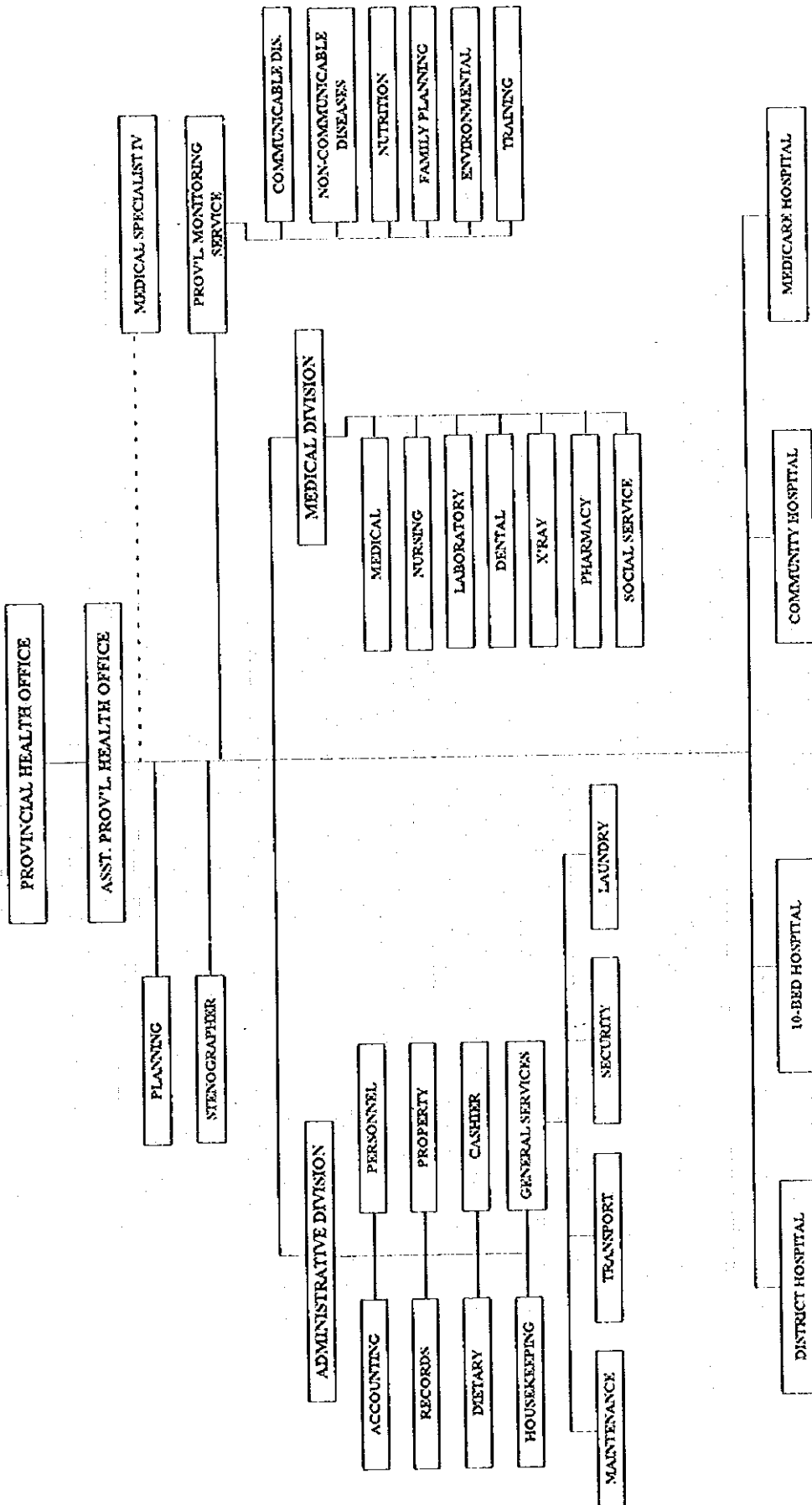


FIGURE 5.5.3
 ORGANIZATIONAL CHART
 PROVINCIAL HEALTH OFFICE
 PROVINCE OF OCCIDENTAL MINDORO





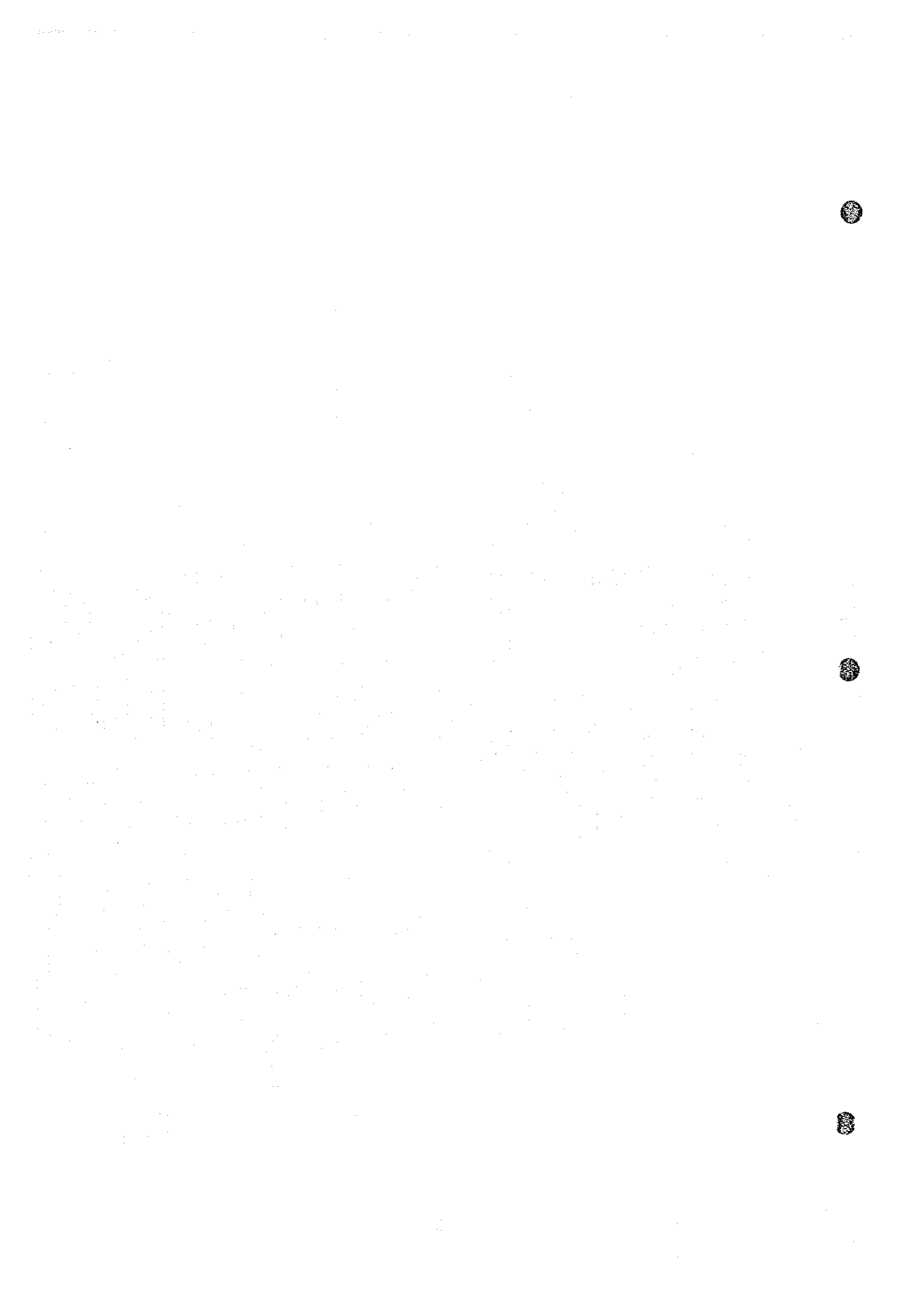
6. PAST FINANCIAL PERFORMANCE IN WATER SUPPLY AND SANITATION
 6.2 Past Public Investment
 6.2.2 Sources of Local Fund

Table 6.2.1 Past Internal Revenue Allotment to Municipalities from Central Government

Unit: Pesos

	1990	1991	1992	1993
1. IRA to all municipalities (National total)	3,054,601,475	4,046,838,742	7,127,522,550	12,484,800,000
2. IRA to municipalities in Occ. Mindoro Province				
<i>Total</i>	27,969,602	36,491,700	69,267,778	124,134,400
Abra de Ilog	2,074,795	2,616,615	5,426,364	9,693,969
Calintaan	1,853,752	2,454,998	4,875,078	8,616,129
Looc	790,419	964,293	2,331,793	3,942,832
Lubang	1,305,017	1,709,648	3,284,033	5,733,442
Magsaysay	1,835,912	2,408,731	4,594,113	8,122,978
Mamburao	1,876,259	2,586,727	4,872,567	8,621,480
Paluan	2,951,131	2,840,559	5,176,736	9,240,306
Rizal	1,859,621	2,438,295	4,399,568	7,760,575
Sablayan	6,473,232	8,788,503	17,623,463	32,265,077
San Jose	4,808,408	6,636,803	10,149,882	18,412,721
Santa Cruz	2,141,056	3,046,528	6,534,181	11,724,891
3. Shares (%) in national total by municipality				
<i>Total</i>	0.916	0.902	0.972	0.994
Abra de Ilog	0.068	0.065	0.076	0.078
Calintaan	0.061	0.061	0.068	0.069
Looc	0.026	0.024	0.033	0.032
Lubang	0.043	0.042	0.046	0.046
Magsaysay	0.060	0.060	0.064	0.065
Mamburao	0.061	0.064	0.068	0.069
Paluan	0.097	0.070	0.073	0.074
Rizal	0.061	0.060	0.062	0.062
Sablayan	0.212	0.217	0.247	0.258
San Jose	0.157	0.164	0.142	0.147
Santa Cruz	0.070	0.075	0.092	0.094

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



7. WATER SOURCE DEVELOPMENT

7.3 Groundwater Sources

7.3.2 Groundwater Availability in the Province

(1) Major Informations and References

Groundwater Availability Map was prepared using the following major informations and references.

- Administrative and Topographical Maps of the Province published by NAMRIA with scales of 1/250,000 and 1/50,000, respectively.
- Geological Map of the Philippines published by BMGS (now defunct) with a scale of 1/1,000,000.
- Groundwater Resources Survey Report of BMGS, 1983.
- Water Resource Investigation conducted by NWRB, 1986.
- Well Inventory Database prepared by NWRB, LWUA, DPWH.
- Well Inventory Database in the province.

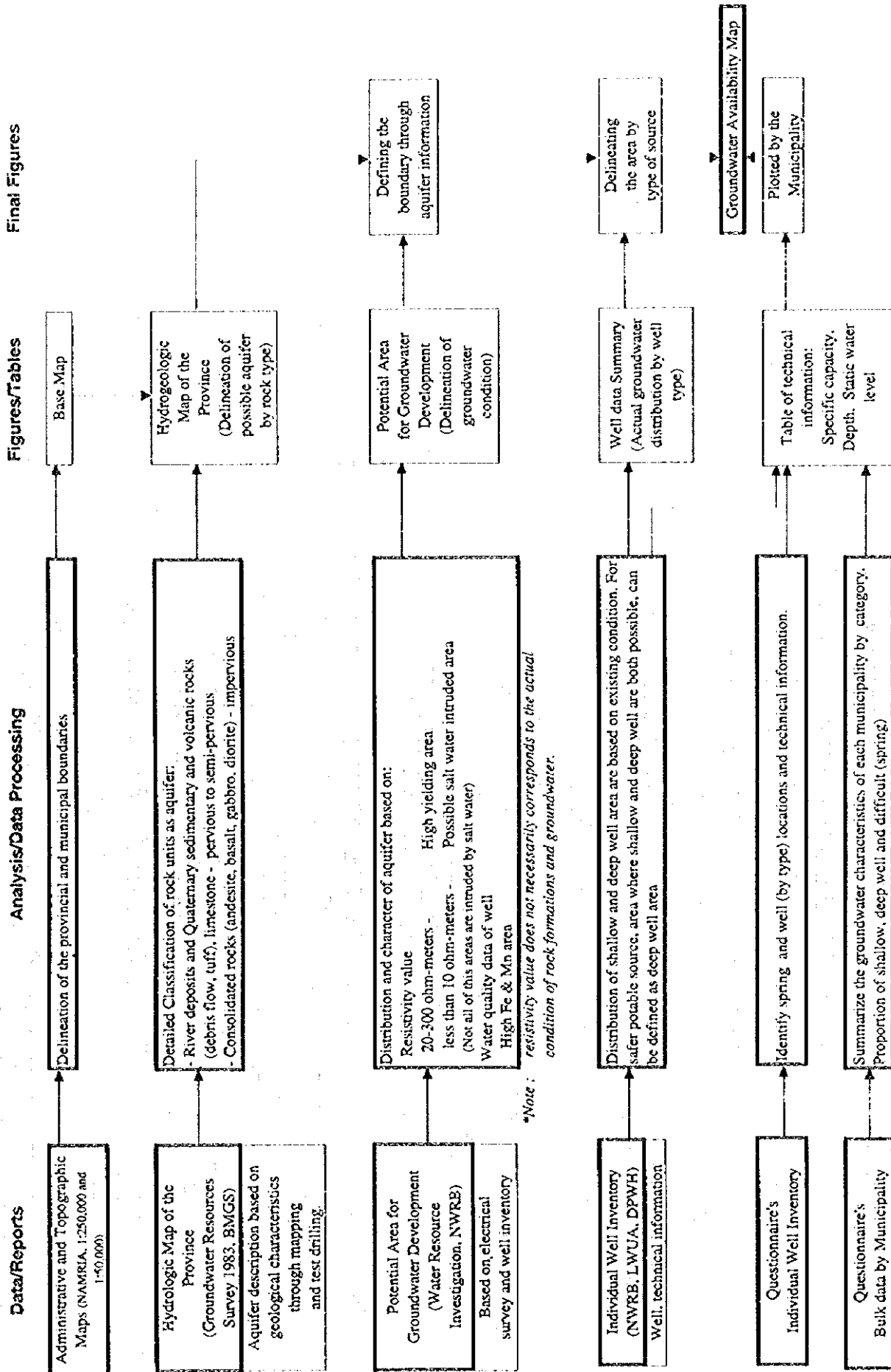
(2) Approach and Methodology

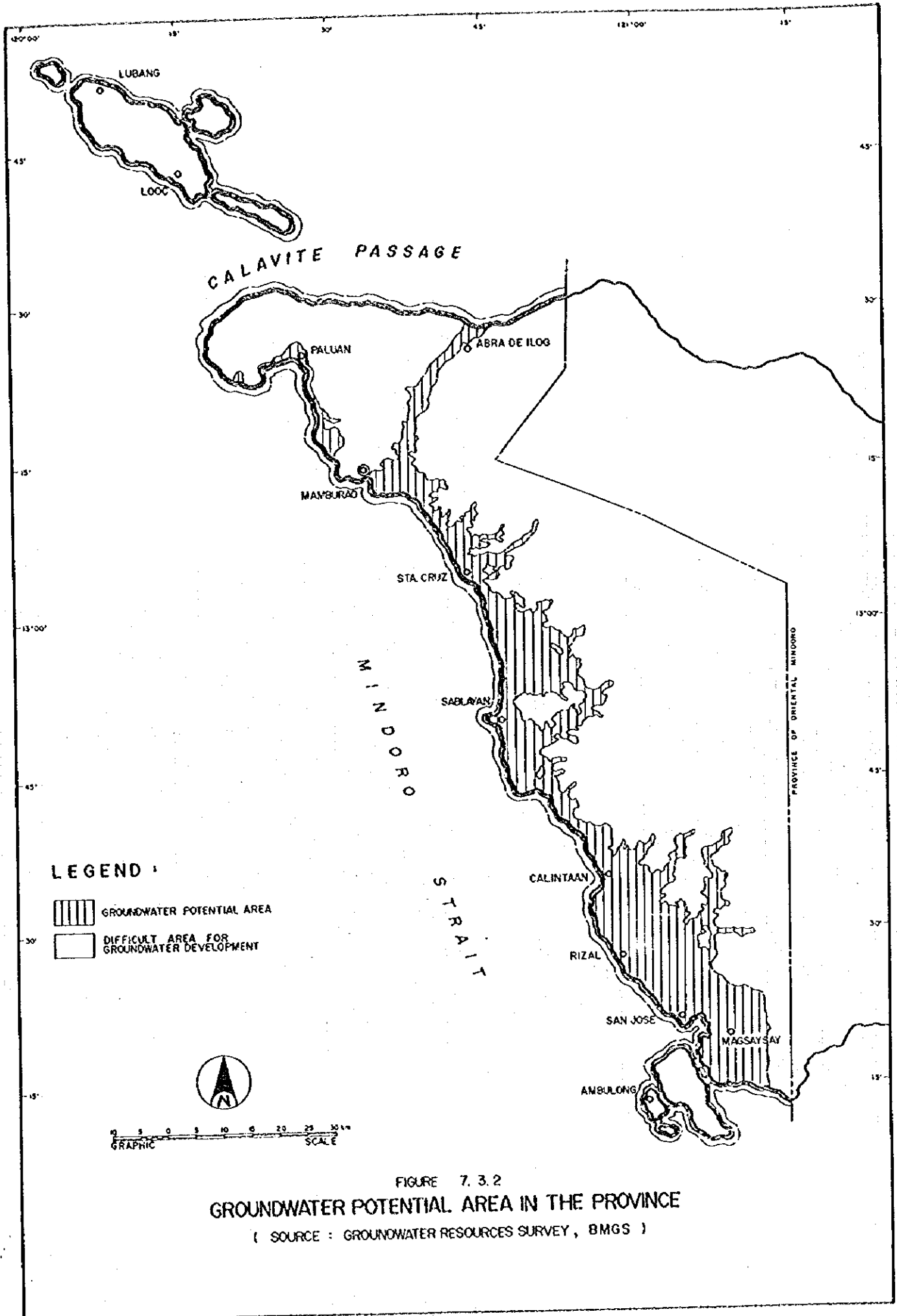
The Groundwater Availability Map was prepared according to the following work flow as presented in Figure 7.3.1:

- 1) Prepare a base map with a scale of 1:250,000 using the Administrative Map (1:250,000) and details are referred from the Topographic Map (1:50,000). Basic information including rivers and provincial/municipal boundaries are indicated on the maps.
- 2) Potential groundwater areas as identified in the Groundwater Resource Survey of BMGS is transferred to the base map. Considering the size of particles and degree of compaction of rock units, alluvial deposits, Quaternary sediments (sandstone and conglomerate) and volcanic rocks (pyroclastics, debris flow and tuff) are regarded as possible aquifers.

In addition to the defined boundaries of the areas underlain by pervious or groundwater bearing formation difficult areas for the groundwater development are also delineated as presented in Figure 7.3.2.

Figure 7.3.1 WORK FLOW OF GROUNDWATER AVAILABILITY MAP



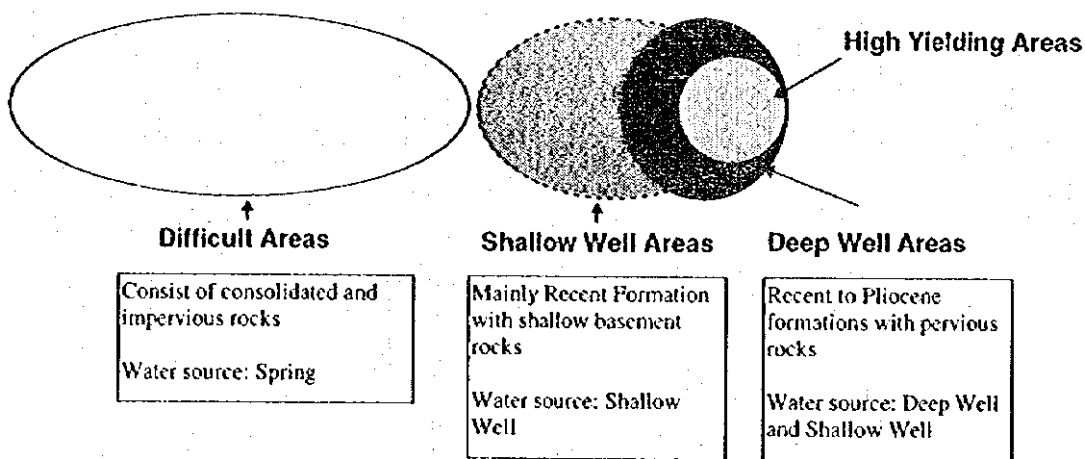


- 3) Areas with potential high yielding formations and with salt water intrusion problem, as established in the Water Resources Investigation of NWRB, are reflected within the area identified as potential for groundwater development.

Based on the result of geo-electric survey of the said investigation, resistivity values of 20-300 ohm-meter are regarded as a potential high yielding formation, while values less than 10 ohm-meter as a potential zone with salty water. Figure 7.3.3 shows the boundaries between high yielding, low yielding, and salty water areas. In addition, considering the results of water quality examination of wells, areas with high iron and manganese concentrations are also indicated on the map since these ions produce aesthetic effects when their allowable limits are exceeded.

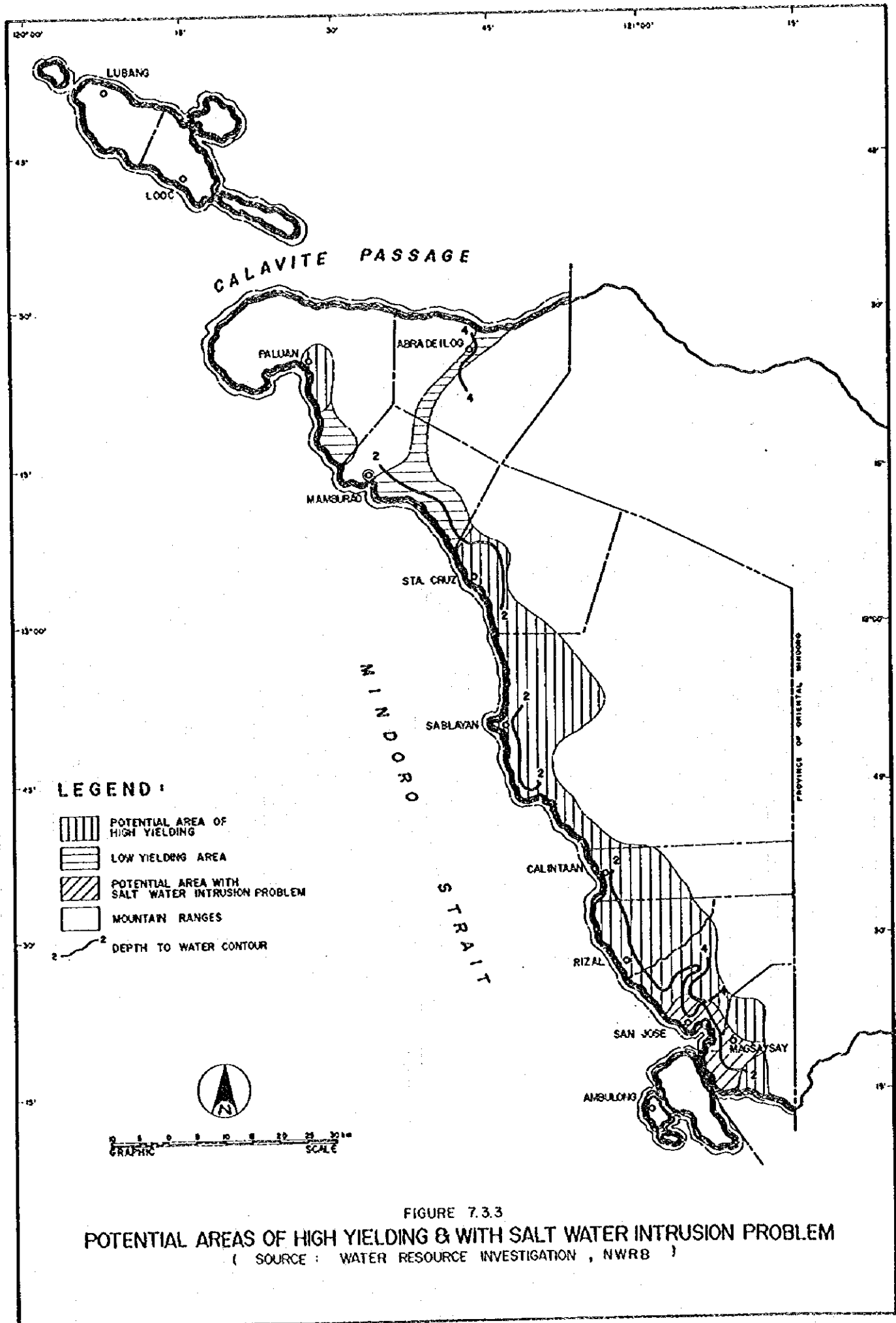
- 4) Shallow and deep well areas are delineated based on the well inventory by municipality (refer to Table 7.3.1, Data report). Figure 7.3.4 presents categorization of areas in terms of groundwater utilization.

Figure 7.3.4 Area Category in Groundwater Utilization



Shallow well areas are defined on the following basis:

- Predominance of existing shallow wells and presence of deep aquifer with water quality problem and/or low yielding capacity.
- Occurrence of impervious rock beneath the Recent formation at shallow depth.



- 5) Standard specifications of wells by municipality presented in the map are based on informations provided by NWRB's well inventory database and provincial database. Individual well locations with technical informations are presented in Figure 7.6.1, Data report.

(3) Manner of updating and utilization of the map

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

- 1) Referring to the results of any further investigation done by BMGS, NWRB or any other agencies, delineation of potential area for groundwater development may be redefined accordingly by applying the above mentioned work process.
- 2) Updating provincial database using questionnaires to make the necessary revision of the boundaries of shallow and deep well areas.

7.4 Spring Sources

Table 7.4.1 Existing Spring Sources by Municipality

Municipality	Total Number	Untapped Spring		Average Yield cu. m/hr
		Number	Percentage (%)	
Abra De Ilog	6	1	16	N.A.
Calintaan	2	0	0	< 4.16
Looc	3	0	0	N.A.
Lubang	2	0	0	N.A.
Magsaysay	4	2	50	N.A.
Mamburao	2	0	0	N.A.
Paluan	4	1	25	21.6
Rizal	3	3	100	N.A.
Sablayan	4	0	0	1.7
San Jose	3	1	33	N.A.
Santa Cruz	4	3	75	N.A.
TOTAL	37	11	30	

Source: Occidental Mindoro PPDO

7.5 Surface Water Sources

Water quality analysis of the two selected rivers was undertaken to determine the general characteristics of surface water in the province.

(1) Study Rivers

The rivers in the province are generally southwestward flowing with drainage areas of 100 to 400 km² and average flow rate of 10 to 40 cu.m/sec. Among such rivers, the Busuanga and Caguray rivers were selected based on the two criteria; with recorded flow measurement and potential for water supply (existence of populated area in the basin). Figure 7.5.1 shows study river basins and Table 7.5.1 presents basic information on these rivers.

Table 7.5.1 River Information and Related Data

River	Drainage Area(km ²)	Flow Rate cu. m/sec.			Relevant Information in the Basin	
		Minimum	Average	Maximum	Major Mun. & Population	Water District
Busuanga River	434	1.71	37.67	133.61	San Jose 87,520	San Jose WD
Caguray River	136	5.97	11.59	308.95	Magsaysay 21,781	San Jose WD

(2) Sampling Points and Examination Procedures

The sampling points in the rivers were located at least 5 kilometers from the river mouth to avoid tidal effect (refer to Figure 7.5.1).

Water sampling was conducted on October 2, 1994 at different points across the river channel. The samples were sent to MWSS laboratory within 24 hours after they were taken. Flow rates were also measured across the river at the same points where the samples were taken. A composite sample was prepared in proportion to flow rates at some points along the cross section of the river.

The water quality analysis, which considers twelve (12) parameters, was performed in accordance with Philippine Standard Method for Analysis of Air and Water.

(3) Results of Water Quality Analysis

Table 7.5.2 summarizes the results of analysis (refer to data sheets prepared by MWSS Central Laboratory, 7.5 Data Report). Flow rates of the Busuanga and Caguray rivers at the time of sampling were 47.85cu.m/sec and 17.66 cu.m/sec, respectively, similar to the average discharges of the two rivers.

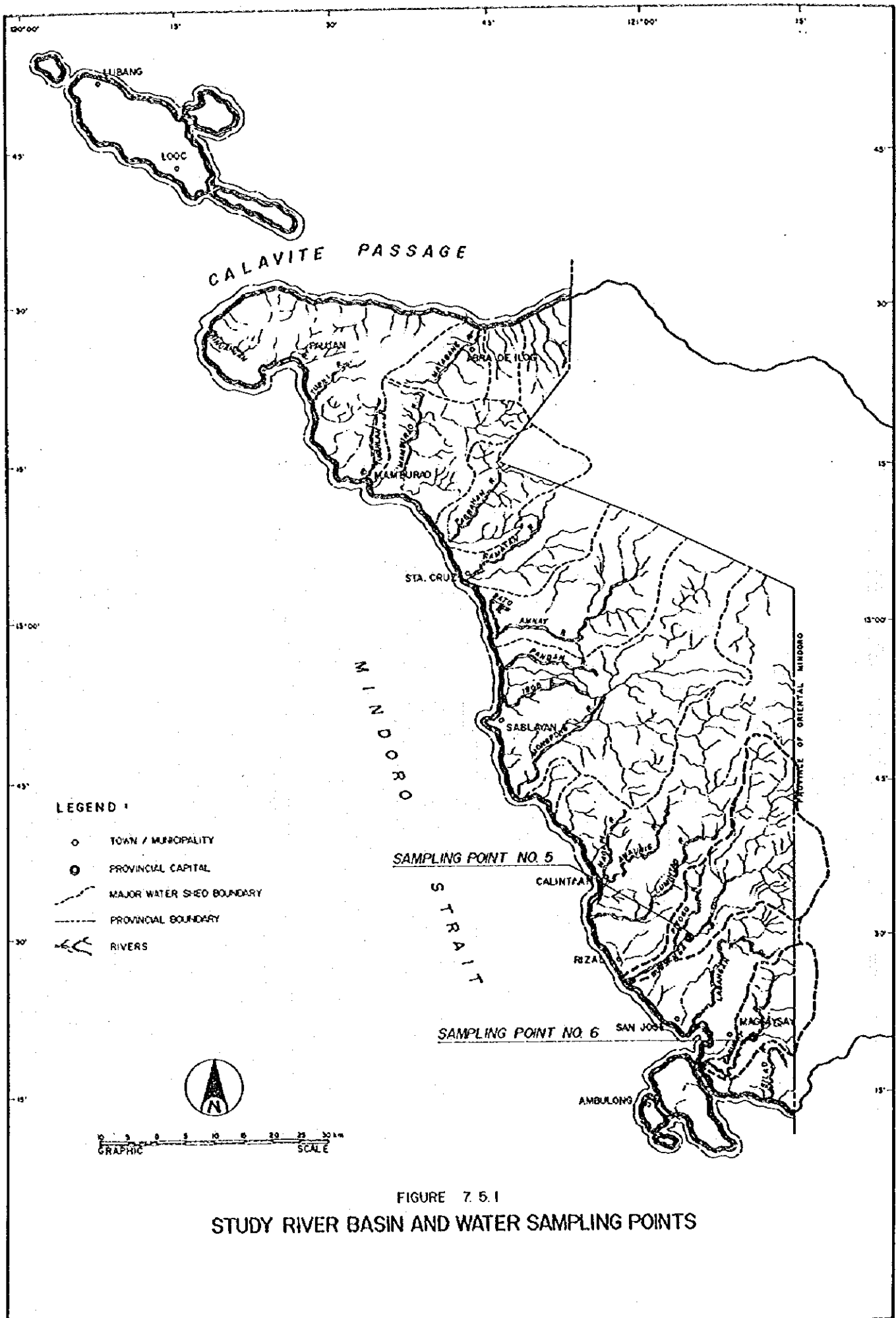


Table 7.5.2 Water Quality Analysis Results

INDICES	UNIT	Class A Water Quality Criteria for Fresh Water	SAMPLE RIVER		REMARKS
			BUSUANGA	CAGURAY	
ph		6.5-8.5	8.3	8.1	within standard
Turbidity, units	unit		70.0	90.0	Both rivers exceeded NSDW of 5 mg/liter
Alkalinity			109.0	179.0	
Color	unit	50	35.0	40.0	within standard
Conductivity	ms/cm		286.00	452.0	within standard
Total Hardness as Ca Co ₃	mg/l	400	124.00	194.0	within standard
Sulfate (SO ₄)	mg/l	200	28.00	25.0	within standard
Chloride (Cl)	mg/l	200	4.20	7.9	within standard
Manganese (Mn)	mg/l	0.5	0.13	0.17	Both rivers exceeded standard
Iron (Fe)	mg/l	1.0	7.60	15.00	
Ammonia - Nitrogen	mg/l		0.40	1.40	Caguray River exceeded standard 1.0 mg/liter
BOD	mg/l	5.0	68	88	Water pollution

Generally, the river water in the province contains relatively high iron. This is due to the iron rich formation of the Mindoro Range, which forms part of the drainage systems. The river water is used for irrigation of rice field. In this connection, a higher Ammonia-Nitrogen concentration may be detected due to direct effect of fertilizer. The computed Biochemical Oxygen Demand (BOD: assumed conversion rate is $BOD/COD = 1/2$) of river water exceeded the standard of 5 mg/liter for Class A Water Quality Criteria for fresh water. Together with the presence of Ammonia-Nitrogen, it suggests that organic pollution caused by wastewater discharge is underway.

7.6 Future Development Potential of Water Sources

The Groundwater Resource Survey Report (BMGS) used is based on the geological investigation covering physical and chemical characteristics of the rock units. It revealed that more than 3/4 of the province is underlain by metamorphic basement rocks, clastic rocks, ultramafic and volcanic flows. The rest is occupied by Late Pliocene to Pleistocene sediments composed of sandstone, siltstone, conglomerate and limestone formation. Major water bearing formations exist in the Recent deposits and Pliocene to Pleistocene sediments, which are

Magsaysay. The province is intensely faulted and fractured resulting in secondary permeability of the rocks.

The Water Resources Investigation Report of NWRB, which is based on the results of geo-resistivity sounding of 35 points, was correlated with field inspection, regional geology and the lithologic logs of existing wells to determine the the sub-surface geology and groundwater conditions in the province. The correlation suggests that the Recent deposits, and semi-consolidated sandstone, siltstone and conglomerate rocks of Pliocene-Pleistocene formation are potential aquifer. In the municipalities of San Jose, Magsaysay, Rizal, Calintaan, Sablayan and Sta. Cruz resistivity values from 22 ohm-meters to 263 ohm-meters are observed at approximate depth of 2 to 100 mbgl. Accordingly, high yielding wells are found in these areas. Low resistivity values of 2 to 7 ohm-meters are recorded near seashore between San Jose and Magsaysay area, where salt water intrusion is conceived. The Water Quality analysis reveals high chloride content in shallow wells of San Jose.

Questionnaires collected from municipalities confirmed the existence of 28,184 wells in the province, while NWRB database includes 190 wells. Table 7.6.1 presents well information by the municipality. Municipalities of SanJose, Sablayan, and Magsaysay are high potential areas for deep well development. In these areas, the average figures of existing deep wells are : 36 to 67 mbgl in depth and 9 to 19 mbgl in water level. Specific capacity ranges from 0.72 to 1.20 l/sec/m. Municipalities of Calintaan, Rizal and Sta. Cruz may be potential areas with deep aquifers available assuming the geological continuity in these area. Municipalities of Abra De Ilog, Mamburao and Paluan are also considered as deep well area, but the extent of deep aquifer may be limited. Islets such as Lubang and Ilin have a limited potential for deep well development due to the existence of basement rocks in shallow depth. In these areas, shallow wells are common with a depth ranging from 7 to 8 mbgs and static water level of 2 to 3 mbgs. Specific capacity ranges from 0.9 to 1.4 cu. l/sec/m. Detailed investigations entailing test drilling, well logging, geo-resistivity testing and pumping tests are necessary to find adequate aquifers in the area.

Individual well locations and specifications are included in Figure 7.6.1, Data Report. The NWRB Database is also attached in Table 7.3.1, Data report. Annual review and updating of these database are essential.

Table 7.6.1 Existing Well Sources (Province of Occidental Mindoro)

Municipality	Type	Number	Average		
			Depth (m)	SWL(m)	Specific Capacity (l/sec/m)
ABRA DE ILOG	Shallow Well	9	9.95	3.86	
	Deep Well	3	40.01	5.64	0.06
	Total	12	17.46	4.31	0.01
AMBULONG	Shallow Well				
	Deep Well				
	Total				
CALINTAAN	Shallow Well				
	Deep Well				
	Total				
LOOC	Shallow Well	15	7.40	2.41	0.93
	Deep Well	1	30.00	15.20	
	Total	16	8.81	3.21	0.93
LUBANG	Shallow Well	24	8.87	2.62	1.32
	Deep Well	7	52.97	5.88	1.48
	Total	31	18.83	3.36	1.36
MAGSAYSAY	Shallow Well	11	7.53	5.17	0.64
	Deep Well	2	36.11	19.01	1.03
	Total	13	11.93	7.30	0.70
MAMBURAO	Shallow Well	13	9.58	2.48	0.48
	Deep Well	5	51.97	8.38	1.20
	Total	18	21.36	4.12	0.68
PALUAN	Shallow Well				
	Deep Well	2	64.79		
	Total	2	64.79		
RIZAL	Shallow Well				
	Deep Well				
	Total				
SAN JOSE	Shallow Well	47	8.58	2.86	1.17
	Deep Well	19	66.56	7.09	0.72
	Total	66	25.27	4.08	1.04
SANTA CRUZ	Shallow Well	13	7.93	2.83	0.16
	Deep Well				
	Total	13	7.93	2.83	0.16
TOTAL	Shallow Well	147	8.58	3.00	1.03
	Deep Well	43	56.25	7.70	1.01
	Total	190	19.36	4.07	1.02

The standard specifications of wells are projected based on NWRBs database and the geological continuity of the province. Table 7.6.2 presents potential sources for water supply by municipality for water supply planning purpose. Spring development may be considered in the difficult area for groundwater development.

Table 7.6.2 Standard Specifications of Wells by Municipality

Municipality	Type	Proportion (%)	Standard Specification			Remarks	
			Depth (m)	SWL (m)	Specific Capacity (l/sec/m)		
Abra De Ilog	Rural	Shallow Well	40	10<D<20	3	0.1	Fe,Mn
		Deep Well	30	20<D<50	5	0.1	Fe,Mn
		Spring	30				
	Urban	Shallow Well	40	10<D<20	3	0.5	
		Deep Well	60	20<D<50	5	0.5	
		Spring	0				
Calintaan	Rural	Shallow Well	60	10<D<20	5	0.3	
		Deep Well	30	20<D<50	10	0.5	
		Spring	10				
	Urban	Shallow Well	0				
		Deep Well	100	20<D<50	3	0.5	
		Spring	0				(C)
Looc	Rural	Shallow Well	0				
		Deep Well	40	20<D<50	5	0.5	
		Spring	60				
	Urban	Shallow Well	60	10<D<20	3	0.5	
		Deep Well	0				
		Spring	40				
Lubang	Rural	Shallow Well	0				
		Deep Well	80	20<D<50	5	1	
		Spring	20				
	Urban	Shallow Well	60	10<D<20	2	0.5	
		Deep Well	40	20<D<50	3	1	
		Spring	0				(C)
Magsaysay	Rural	Shallow Well	40	10<D<20	3	0.5	
		Deep Well	60	20<D<50	5	1	(C)
		Spring	0				2 untapped springs
	Urban	Shallow Well	0				
		Deep Well	100	20<D<50	5	1	
		Spring	0				
Mamburao	Rural	Shallow Well	10	10<D<20	3	0.5	Fe,Mn
		Deep Well	90	20<D<50	5	1	Fe,Mn
		Spring	0				
	Urban	Shallow Well	20	10<D<20	3	0.5	
		Deep Well	80	20<D<50	5	1	Fe,Mn
		Spring	0				
Paluan	Rural	Shallow Well	0				
		Deep Well	0				
		Spring	100				1 untapped spring (22 cu. m/h)
	Urban	Shallow Well	60	10<D<20	5	1	
		Deep Well	10	50<D<100		1	
		Spring	30				
Rizal	Rural	Shallow Well	0				
		Deep Well	100	20<D<50	5	1	(C)
		Spring	0				
	Urban	Shallow Well	0				
		Deep Well	100	50<D<100	10	1	
		Spring	0				
Sablayan	Rural	Shallow Well	20	10<D<20	3	0.5	Fe,Mn
		Deep Well	60	20<D<50	8	0.5	Fe,Mn
		C	20				
	Urban	Shallow Well	0				
		Deep Well	100	20<D<50	3	1	(C)
		Spring	0				
San Jose	Rural	Shallow Well	40	10<D<20	3	1	Only in Hin Island
		Deep Well	40	20<D<50	5	1	(C)
		Spring	20				
	Urban	Shallow Well	0				
		Deep Well	100	20<D<50	5	1	(C)
		Spring	0				
Santa Cruz	Rural	Shallow Well	30	10<D<20	3	0.5	Fe,Mn
		Deep Well	70	20<D<50	5	1	Fe,Mn
		Spring	0				3 untapped springs
	Urban	Shallow Well	0				
		Deep Well	100	20<D<50	5	1	
		Spring	0				

* Specifications are estimated by using NWRB Well Inventory Database and geological continuity of the aquifer

** Urban area is limited in Publication

Legend Depth (m): 10<D<20 Depth between 10m and 20m
 20<D<50 Depth between 20m and 50m
 50<D<100 Depth between 50m and 100m
 100<D<150 Depth between 100m and 150m

Remarks: C1 Possible salt water intrusion near the sea shore
 Fe High iron content water
 Mn High manganese content water

**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

Municipality	Type	Population (1994)	Population Served by 1994 Facilities				Pop. Served by Planned/ On-going Projects				Pop. Served in the Base Year (1994)				
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	% Coverage
Abra de Ilog	Urban	1,733	1,354	0	49	1,403	0	0	0	0	1,354	0	49	1,403	81
	Rural	11,894	118	118	140	376	0	0	0	0	118	118	140	376	3
	Total	13,627	1,472	118	189	1,779	0	0	0	0	1,472	118	189	1,779	13
Calintaan	Urban	6,024	0	0	4,806	4,806	0	0	0	0	0	0	4,806	4,806	80
	Rural	13,763	0	0	9,786	9,786	0	0	0	0	0	0	9,786	9,786	71
	Total	19,787	0	0	14,592	14,592	0	0	0	0	0	0	14,592	14,592	74
Looc	Urban	2,511	0	0	17	17	0	0	0	0	0	0	17	17	1
	Rural	4,836	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	7,347	0	0	17	17	0	0	0	0	0	0	17	17	0
Labang	Urban	6,245	3,731	0	0	3,731	0	0	0	0	3,731	0	0	3,731	60
	Rural	14,292	1,695	0	0	1,695	0	0	0	0	1,695	0	0	1,695	12
	Total	20,537	5,426	0	0	5,426	0	0	0	0	5,426	0	0	5,426	26
Magsaysay	Urban	7,346	1,316	102	917	2,335	0	0	0	0	1,316	102	917	2,335	32
	Rural	16,247	324	0	2,939	3,263	0	0	0	0	324	0	2,939	3,263	20
	Total	23,593	1,640	102	3,856	5,598	0	0	0	0	1,640	102	3,856	5,598	24
Mamburao (Capital)	Urban	12,287	7,404	235	292	7,931	1,548	0	0	1,548	8,952	235	292	9,479	77
	Rural	12,141	0	0	669	669	0	0	0	0	0	0	669	669	6
	Total	24,428	7,404	235	961	8,600	1,548	0	0	1,548	8,952	235	961	10,148	42
Paluan	Urban	3,866	0	1,848	534	2,382	0	0	0	0	0	1,848	534	2,382	62
	Rural	4,045	0	0	747	747	0	0	0	0	0	0	747	747	18
	Total	7,911	0	1,848	1,281	3,129	0	0	0	0	0	1,848	1,281	3,129	40
Rizal	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	25,819	0	0	19,970	19,970	0	0	0	0	0	0	19,970	19,970	77
	Total	25,819	0	0	19,970	19,970	0	0	0	0	0	0	19,970	19,970	77
Soblayan	Urban	12,654	5,300	0	5,263	10,563	504	0	0	504	5,804	0	5,263	11,067	87
	Rural	38,874	178	561	23,593	24,337	0	0	0	0	178	561	23,593	24,337	63
	Total	51,528	5,478	561	28,861	34,900	504	0	0	504	5,982	561	28,861	35,404	69
San Jose	Urban	34,212	10,509	187	12,211	22,907	1,825	0	0	1,825	12,334	187	12,211	24,732	72
	Rural	63,208	0	345	29,350	29,695	0	0	0	0	0	345	29,350	29,695	47
	Total	97,420	10,509	532	41,561	52,602	1,825	0	0	1,825	12,334	532	41,561	54,427	56
Sta. Cruz	Urban	3,267	0	0	1,081	1,081	2,587	0	0	2,587	2,587	0	680	3,267	100
	Rural	15,183	0	0	4,964	4,964	1,118	0	0	1,118	1,118	0	4,964	6,082	40
	Total	18,450	0	0	6,045	6,045	3,705	0	0	3,705	3,705	0	5,644	9,349	51
Provincial Total	Urban	90,145	29,614	2,372	25,170	57,156	6,464	0	0	6,464	36,078	2,372	24,769	63,219	70
	Rural	220,302	2,315	1,024	92,163	95,502	1,118	0	0	1,118	3,433	1,024	92,163	96,620	44
	Total	310,447	31,929	3,396	117,333	152,658	7,582	0	0	7,582	39,511	3,396	116,932	159,839	51

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

Municipality	Type	Population Served by Existing Facilities				1994		2000	
		Level III	Level II	Level I	Total	Total Population	Coverage (%)	Total Population	Coverage (%)
Abra de Ilog	Urban	1,354	0	49	1,403	1,233	81	1,816	77
	Rural	118	118	140	376	11,894	3	11,839	3
	Total	1,472	118	189	1,779	13,627	13	13,655	13
Calintaan	Urban	0	0	4,806	4,806	6,024	80	7,340	65
	Rural	0	0	9,786	9,786	13,763	71	15,244	64
	Total	0	0	14,592	14,592	19,787	74	22,584	65
Looc	Urban	0	0	17	17	2,511	1	4,570	0
	Rural	0	0	0	0	4,836	0	3,268	0
	Total	0	0	17	17	7,347	0	7,838	0
Lubang	Urban	3,731	0	0	3,731	6,245	60	7,131	52
	Rural	1,695	0	0	1,695	14,292	12	16,318	10
	Total	5,426	0	0	5,426	20,537	26	23,449	23
Magsaysay	Urban	1,316	102	917	2,335	7,346	32	8,658	27
	Rural	324	0	2,939	3,263	16,247	20	18,312	18
	Total	1,640	102	3,856	5,598	23,593	24	26,970	21
Mamburao (Capital)	Urban	8,952	235	292	9,479	12,287	77	13,723	69
	Rural	0	0	669	669	12,141	6	15,290	4
	Total	8,952	235	961	10,148	24,428	42	29,013	35
Paluan	Urban	0	1,848	534	2,382	3,866	62	5,117	47
	Rural	0	0	747	747	4,045	18	3,369	22
	Total	0	1,848	1,281	3,129	7,911	40	8,486	37
Rizal	Urban	0	0	0	0	0	0	2,485	0
	Rural	0	0	19,970	19,970	25,819	77	27,479	73
	Total	0	0	19,970	19,970	25,819	77	29,964	67
Sablayan	Urban	5,804	0	5,263	11,067	12,654	87	18,605	59
	Rural	178	561	23,598	24,337	38,874	63	41,412	59
	Total	5,982	561	28,861	35,404	51,528	69	60,017	59
San Jose	Urban	12,334	187	12,211	24,732	34,212	72	40,178	62
	Rural	0	345	29,350	29,695	63,208	47	74,231	40
	Total	12,334	532	41,561	54,427	97,420	56	114,409	48
Sta Cruz	Urban	2,587	0	680	3,267	3,267	100	4,595	71
	Rural	1,118	0	4,964	6,082	15,183	40	16,879	36
	Total	3,705	0	5,644	9,349	18,450	51	21,474	44
Provincial Total	Urban	36,078	2,372	24,769	63,219	90,145	70	114,218	55
	Rural	3,433	1,024	92,163	96,620	220,302	44	243,641	40
	Total	39,511	3,396	116,932	159,839	310,447	51	357,859	45

Table 8.2.3 Number of Households Served by Sanitary Toilets in the Base Year (1994)

Municipality	Area	1994		Households Using Sanitary Toilets in 1994				Recipient HHs of Planned/On-going Projects				Households Using Sanitary Toilets in Base Year (1994)							
		Population	HHs	Flush	Pour Flush	VIP	Total	Flush	Pour Flush	VIP	Total	Number				Coverage (%)			
												Flush	Pour Flush	VIP	Total	Flush	Pour Flush	VIP	Total
Abra de Ilog	Urban	1,733	361	141	144	0	285	0	15	0	15	141	159	0	300	39	41	0	83
	Rural	11,894	2,511	13	838	0	851	0	285	0	285	13	1,123	0	1,136	1	44	0	45
	Total	13,627	2,892	154	982	0	1,136	0	300	0	300	154	1,282	0	1,436	5	44	0	50
Calintaan	Urban	6,024	1,095	0	711	0	711	0	20	0	20	0	731	0	731	0	67	0	67
	Rural	13,763	2,647	0	1,850	0	1,850	0	180	0	180	0	2,060	0	2,060	0	78	0	78
	Total	19,787	3,742	0	2,591	0	2,591	0	200	0	200	0	2,791	0	2,791	0	75	0	75
Looc	Urban	2,511	584	0	335	0	335	0	10	0	10	0	345	0	345	0	59	0	59
	Rural	4,836	1,008	0	789	0	789	0	90	0	90	0	879	0	879	0	81	0	81
	Total	7,347	1,592	0	1,124	0	1,124	0	100	0	100	0	1,224	0	1,224	0	71	0	71
Lubang	Urban	6,245	1,419	424	575	0	999	0	60	0	60	424	635	0	1,059	30	45	0	75
	Rural	14,292	2,917	173	1,559	0	1,732	0	340	0	340	173	1,899	0	2,072	6	65	0	71
	Total	20,537	4,336	597	2,134	0	2,731	0	400	0	400	597	2,534	0	3,131	14	58	0	72
Magsaysay	Urban	7,346	1,440	129	1,158	0	1,287	0	15	0	15	129	1,173	0	1,302	9	81	0	90
	Rural	16,247	3,009	30	1,658	0	1,688	0	285	0	285	30	1,943	0	1,973	1	65	0	66
	Total	23,593	4,449	159	2,816	0	2,975	0	300	0	300	159	3,116	0	3,275	4	70	0	74
Mamburao (Capital)	Urban	12,287	2,508	755	775	0	1,530	0	170	0	170	755	945	0	1,700	20	38	0	68
	Rural	12,141	2,381	0	936	0	936	0	680	0	680	0	1,616	0	1,616	0	68	0	68
	Total	24,428	4,889	755	1,711	0	2,466	0	850	0	850	755	2,561	0	3,316	15	52	0	68
Paluan	Urban	3,866	805	0	148	285	433	0	20	0	20	0	168	285	453	0	24	35	56
	Rural	4,045	879	0	0	141	141	0	180	0	180	0	180	141	321	0	20	16	37
	Total	7,911	1,684	0	148	426	574	0	200	0	200	0	348	426	774	0	21	25	46
Rizal	Urban	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rural	25,819	4,965	0	2,654	0	2,654	0	400	0	400	0	3,054	0	3,054	0	62	0	62
	Total	25,819	4,965	0	2,654	0	2,654	0	400	0	400	0	3,054	0	3,054	0	62	0	62
Sablayan	Urban	12,654	2,388	500	883	0	1,383	0	100	0	100	500	933	0	1,483	21	41	0	62
	Rural	38,874	7,622	18	4,595	0	4,613	0	300	0	300	18	4,895	0	4,913	0	64	0	64
	Total	51,528	10,010	518	5,478	0	5,996	0	400	0	400	518	5,878	0	6,396	5	59	0	64
San Jose	Urban	34,212	6,579	1,010	3,864	0	4,874	0	175	0	175	1,010	4,039	0	5,049	15	61	0	77
	Rural	63,208	11,926	0	8,598	0	8,598	0	525	0	525	0	9,123	0	9,123	0	76	0	76
	Total	97,420	18,505	1,010	12,462	0	13,472	0	700	0	700	1,010	13,162	0	14,172	5	71	0	77
Sta. Cruz	Urban	3,267	583	0	394	0	394	0	30	0	30	0	424	0	424	0	73	0	73
	Rural	15,183	2,865	0	1,007	645	1,652	0	270	0	270	0	1,277	645	1,922	0	45	23	67
	Total	18,450	3,448	0	1,401	645	2,046	0	300	0	300	0	1,701	645	2,346	0	49	19	65
Provincial Total	Urban	90,145	17,762	2,959	8,987	285	12,231	0	615	0	615	2,959	9,602	285	12,846	17	51	2	72
	Rural	220,302	42,750	234	24,514	786	25,534	0	3,535	0	3,535	234	28,049	786	29,069	1	66	2	68
	Total	310,447	60,512	3,193	33,501	1,071	37,765	0	4,150	0	4,150	3,193	37,651	1,071	41,915	5	62	2	69

Table 8.2.4 Number of Public School Students Served by School Toilets in Base Year (1994)

Municipality	1994 Total No. of Public School Students	Std. No. of Students that can be Served by 1994 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 (1994)	Coverage (%)
Abra de Ilog	2,207	800	0	800	36
Calintaan	4,194	900	0	900	21
Looc	1,596	450	0	450	28
Lubang	3,258	750	0	750	23
Magsaysay	6,663	1,500	0	1,500	23
Mamburao (Capital)	5,920	900	0	900	15
Paluan	2,120	600	0	600	28
Rizal	5,600	750	0	750	13
Sablayan	4,587	700	0	700	15
San Jose	14,421	2,700	0	2,700	19
Sta. Cruz	4,403	700	0	700	16
Provincial Total	54,969	10,750	0	10,750	20

Table 8.2.5 Number of Public Utilities with Sanitary Toilets in the Base Year (1994)

Municipality	Type	No. of PU with Toilets in 1994	No. of PU with Sanitary Toilets in 1994	No. of PU with Toilets in Planned/ On-going Project	No. of PU with Sanitary Toilets in Planned/ On-going Projects	No. of PU with Toilets in Base Year 1994	No. of PU with Sanitary Toilets in Base year 1994	Coverage (%)
Abra de Ilog	Public Market	1	0	0	0	1	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	0	0	0	1	0	0
Calintaan	Public Market	0	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0
Looc	Public Market	0	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0
Lubang	Public Market	0	0	0	0	0	0	0
	Bus/Jeep Terminal	1	1	0	0	1	1	100
	Total	1	1	0	0	1	1	100
Magsaysay	Public Market	0	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0
Mamburao (Capital)	Public Market	2	0	0	0	2	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	2	0	0	0	2	0	0
Paluan	Public Market	1	0	0	0	1	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	0	0	0	1	0	0
Rizal	Public Market	0	0	0	0	0	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0
Sablayan	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
San Jose	Public Market	1	0	0	0	1	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	0	0	0	1	0	0
Sta. Cruz	Public Market	1	0	0	0	1	0	0
	Bus/Jeep Terminal	0	0	0	0	0	0	0
	Total	1	0	0	0	1	0	0
Provincial Total	Public Market	7	1	0	0	7	1	14
	Bus/Jeep Terminal	1	1	0	0	1	1	100
	Total	8	2	0	0	8	2	25

Note: PU - Public Utilities

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

Municipality	Area	No. of Household Served by Existing Facilities				Coverage in 1994							Coverage in 2000				
		Flush	Pour Flush	VIP Latrine	Total	No. of HHs	Served Households				Served Population		No. of HHs	Served Households			
							Flush	Pour Flush	VIP Latrine	Total	Number	%		Flush	Pour Flush	VIP Latrine	Total
Abra de Ilog	Urban	141	159	0	300	361	39	44	0	83	1,438	83	378	37	42	0	79
	Rural	13	1,123	0	1,136	2,531	1	44	0	45	5,352	45	2,519	1	45	0	45
	Total	154	1,282	0	1,436	2,892	5	44	0	50	6,814	50	2,897	5	44	0	50
Calintaan	Urban	0	731	0	731	1,095	0	67	0	67	4,036	67	1,335	0	55	0	55
	Rural	0	2,060	0	2,060	2,647	0	78	0	78	10,735	78	2,932	0	70	0	70
	Total	0	2,791	0	2,791	3,742	0	75	0	75	14,840	75	4,267	0	65	0	65
Looc	Urban	0	345	0	345	584	0	59	0	59	1,481	59	1,063	0	32	0	32
	Rural	0	879	0	879	1,008	0	87	0	87	4,207	87	681	0	100	0	100
	Total	0	1,224	0	1,224	1,592	0	77	0	77	5,657	77	1,744	0	70	0	70
Lubang	Urban	424	635	0	1,059	1,419	30	45	0	75	4,694	75	1,621	26	39	0	65
	Rural	173	1,899	0	2,072	2,917	6	65	0	71	10,147	71	3,330	5	57	0	62
	Total	597	2,534	0	3,131	4,336	14	53	0	72	14,787	72	4,951	12	51	0	63
Magsaysay	Urban	129	1,173	0	1,302	1,430	9	81	0	90	6,611	90	1,698	8	69	0	77
	Rural	30	1,943	0	1,973	3,009	1	65	0	66	10,723	66	3,391	1	57	0	58
	Total	159	3,116	0	3,275	4,439	4	70	0	74	17,459	74	5,089	3	61	0	64
Mamburao (Capital)	Urban	755	945	0	1,700	2,508	30	38	0	68	8,355	68	2,801	27	34	0	61
	Rural	0	1,616	0	1,616	2,381	0	68	0	68	8,256	68	2,993	0	54	0	54
	Total	755	2,561	0	3,316	4,889	15	52	0	68	16,611	68	5,799	13	44	0	57
Paluan	Urban	0	168	285	453	805	0	21	35	56	2,165	56	1,066	0	16	27	42
	Rural	0	180	141	321	879	0	20	16	37	1,497	37	732	0	25	19	44
	Total	0	348	426	774	1,684	0	21	25	46	3,639	46	1,798	0	19	24	43
Rizal	Urban	0	0	0	0	0	0	0	0	0	0	0	487	0	0	0	0
	Rural	0	3,054	0	3,054	4,965	0	62	0	62	16,008	62	5,284	0	58	0	58
	Total	0	3,054	0	3,054	4,965	0	62	0	62	16,008	62	5,771	0	53	0	53
Sablayan	Urban	500	983	0	1,483	2,388	21	41	0	62	7,845	62	3,510	14	28	0	42
	Rural	18	4,895	0	4,913	7,622	0	64	0	64	24,879	64	8,120	0	60	0	61
	Total	518	5,878	0	6,396	10,010	5	59	0	64	32,978	64	11,630	4	54	0	55
San Jose	Urban	1,010	4,039	0	5,049	6,579	15	61	0	77	26,343	77	7,727	13	52	0	65
	Rural	0	9,123	0	9,123	11,926	0	76	0	76	48,038	76	14,006	0	65	0	65
	Total	1,010	13,162	0	14,172	18,505	5	71	0	77	75,013	77	21,733	5	61	0	65
Sta. Cruz	Urban	0	424	0	424	583	0	73	0	73	2,385	73	821	0	52	0	52
	Rural	0	1,277	645	1,922	2,865	0	45	23	67	10,173	67	3,185	0	40	20	60
	Total	0	1,701	645	2,346	3,448	0	49	19	68	12,546	68	4,006	0	42	16	59
Provincial Total	Urban	2,959	9,602	285	12,846	17,762	17	54	2	72	63,345	72	22,507	13	43	1	57
	Rural	234	28,049	786	29,069	42,750	1	66	2	68	150,015	68	47,178	0	59	2	62
	Total	3,193	37,651	1,071	41,915	60,512	5	62	2	69	213,360	69	69,685	5	54	2	60

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

Municipality	Std. No. of Students that can be Served by Base Year (1994)	Public Schools Toilets				Public Toilets					
		Coverage in 1994		Coverage in 2000		Coverage in 1994			Coverage in 2000		
		Total No. of Public School Students	%	Total No. of Public School Students	%	No. of PU with Toilets in Base Year	No. of PU with Sanitary Toilets in Base Year (1994)	%	No. of PU with Toilets	No. of PU with Sanitary Toilets	%
Abra de Ilog	800	2,207	36	2,199	36	1	0	0	2	0	0
Calintaan	900	4,191	21	5,228	17	0	0	0	1	0	0
Looc	450	1,596	28	1,785	25	0	0	0	1	0	0
Lubang	750	3,258	23	4,093	18	1	1	100	2	1	50
Magsaysay	1,500	6,663	23	8,259	18	0	0	0	1	0	0
Mamburao (Capital)	900	5,920	15	7,888	11	2	0	0	3	0	0
Paluan	600	2,120	28	2,390	25	1	0	0	1	0	0
Rizal	750	5,600	13	7,203	10	0	0	0	1	0	0
Sablayan	700	4,587	15	5,936	12	1	1	100	2	1	50
San Jose	2,700	14,421	19	18,951	14	1	0	0	2	0	0
Sta. Cruz	700	4,403	16	5,685	12	1	0	0	1	0	0
Provincial Total	10,750	54,969	20	69,647	15	3	2	25	17	2	12

Note: PU - Public Utilities

8.3 Projection of Frame Values

8.3.1 Population Projection

(1) Review of past population development

1) 1990 population distribution in urban and rural areas

The 1990 population census results conducted by NSO were reviewed in terms of population distribution in urban and rural areas. In application of revised classification of barangays in urban or rural category, population by municipality was adjusted as shown in Table 8.3.1.

Table 8.3.1 Population Distribution in Urban and Rural Areas

Municipality	Total Population	Census Data		Adjusted Population	
		Urban	Rural	Urban	Rural
Occ. Mindoro	282,593	101,653	180,940	78,689	203,904
Abra de Ilog	13,609	1,680	11,929	1,680	11,929
Calintaan	18,117	5,280	12,837	5,280	12,837
Looc	7,037	1,684	5,353	1,684	5,353
Lubang	18,800	8,545	10,255	5,717	13,083
Magsaysay	21,580	14,996	6,584	6,584	14,996
Mamburao	21,781	11,414	10,367	11,414	10,367
Paluan	7,549	3,207	4,342	3,207	4,342
Rizal	23,379	1,939	21,440	0	23,379
Sablayan	46,546	9,786	36,760	9,786	36,760
San Jose	87,520	40,520	47,000	30,735	56,785
Sta. Cruz	16,675	2,602	14,073	2,602	14,073

Note: Classification of barangays in urban and rural was arranged by PSPT.

2) Characteristics of past population development

Major statistical data of past population development are shown in Table 8.3.2.

Table 8.3.2 Past Population Development

Area	Description	Total		Urban		Rural	
		1980	1990	1980	1990	1980	1990
Region IV	Population	6,118,620	8,263,099	2,268,828	4,160,133	3,849,792	4,102,966
	Growth Rate	3.1%		6.3%		0.6%	
Occidental Mindoro	Population	222,431	282,593	41,897	78,689	180,534	203,904
	Growth Rate	2.4%		6.5%		1.2%	
	Provincial Profile 1/	3.6%	3.4%	1.9%	1.9%	4.7%	5.0%

Note: 1/ Provincial population percentage to regional population

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

- The province recorded 2.4% of annual growth rate lower than that of the region at 3.1%. Regional average rate might have affected by the economic development in Metro Manila and its adjacent provinces.
- Percentage of provincial population to the regional population decreased from 3.6% in 1980 to 3.4% in 1990, although, rural population percentage increased.

The experiences in the past population trend revealed that the province was not affected drastically by the economic and population development as observed in the region. The future population may therefore remain under similar conditions as experienced in the last census decade, unless specific development takes place in the province.

(2) Population Projection

NSO projected population for the years 2000 and 2010 broken down up to urban and rural population by municipality, base year of which is 1990. Modification of the projected population was made through the following study.

- 1) Review of NSO projection in total population and annual growth rate at regional and provincial levels.
- 2) Review of the same at municipal level.
- 3) Review of population distribution to urban and rural areas at municipal level in comparison with 1990 population distribution under re-classification of barangays.

Population and its growth rates by target year both for the province and the region were confirmed to be reasonable reflecting the trend of past population development, as shown in Table 8.3.3.

Table 8.3.3 Population Projection for Target Years: Region and Province

	Population and Provincial Share in the Region			Growth Rate (%)		
	1990	2000	2010	1980 - 1990	1990 - 2000	2000 - 2010
Region IV	8,263,099	11,273,000	14,087,000	3.1	3.2	2.3
Occidental Mindoro	282,593	357,859	427,498	2.4	2.4	1.8
	3.4%	3.2%	3.0%			

Municipal population projected by NSO for the target years is also within the range of the past population development.

Municipal population distribution to urban and rural areas for the target years was adjusted corresponding to reclassification of some barangays arranged for the year 1990. It is assumed that the profile of municipal population distribution in 1990 by urban and rural area will prevail through the future. Population for all municipalities in 1994 by urban and rural areas was then projected using respective annual growth rates employed between 1990 and 2000 in the above mentioned study (base year 1990). Table 8.3.4 shows provincial population by urban and rural area for the target years.

Table 8.3.4 Provincial Population of Target Years

Area	Population/ Composition	1990	1994	2000	2010
Total	Population	282,593	310,447	357,859	427,498
Urban	Population	78,689	90,145	114,218	145,940
Area	Composition (%)	28	29	32	34
Rural	Population	203,904	220,302	243,641	281,558
Area	Composition (%)	72	71	68	66

Number of Households in the year 2000 was estimated by urban and rural area of each municipality based on the assumption that the household size (persons/household) given by the 1990 population census will prevail up to the year, while that for 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 8.3.5 presents projected number of households for the target years.

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

Municipality	Household Size			Number of Households											
	1990			1990			1994			2000			2010		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Abra de Ilog	4.8	4.7	4.7	347	2,542	2,889	361	2,531	2,892	378	2,519	2,897	583	3,495	4,078
Cabitan	5.5	5.2	5.3	966	2,464	3,430	1,095	2,647	3,742	1,335	2,932	4,267	2,408	4,337	6,745
Lece	4.3	4.8	4.7	388	1,105	1,493	584	1,008	1,592	1,063	651	1,744	1,742	599	2,341
Lubang	4.4	4.9	4.7	1,313	2,685	3,998	1,419	2,917	4,336	1,621	3,350	4,931	2,130	4,874	7,004
Magsaysay	5.1	5.4	5.3	1,293	2,800	4,093	1,440	3,009	4,449	1,698	3,391	5,089	2,714	5,340	8,054
Mankurao (Capital)	4.9	5.1	5.0	2,321	2,029	4,350	2,508	2,381	4,889	2,801	2,998	5,799	3,657	5,009	8,666
Palaon	4.8	4.6	4.7	669	946	1,615	805	879	1,684	1,066	732	1,798	1,655	879	2,534
Rizal	0.0	5.2	5.2	0	4,468	4,468	0	4,965	4,965	487	5,284	5,771	742	8,207	8,949
Sablayan	5.3	5.1	5.2	1,848	7,190	9,038	2,388	7,622	10,010	3,510	8,120	11,630	7,349	10,575	17,924
San Jose	5.2	5.3	5.3	5,966	10,698	16,664	6,579	11,926	18,505	7,227	14,006	21,733	11,992	22,162	34,158
Sia Cruz	5.6	5.3	5.3	462	2,676	3,138	583	2,865	3,448	821	3,185	4,006	1,257	5,156	6,413
Provincial Total	5.1	5.1	5.1	15,573	39,603	55,176	17,762	42,750	60,512	22,507	47,178	69,685	36,236	70,640	106,876

8.3.2 School Enrollment Projection

Table 8.3.6 Projected School Enrollment by Municipality by Target Year

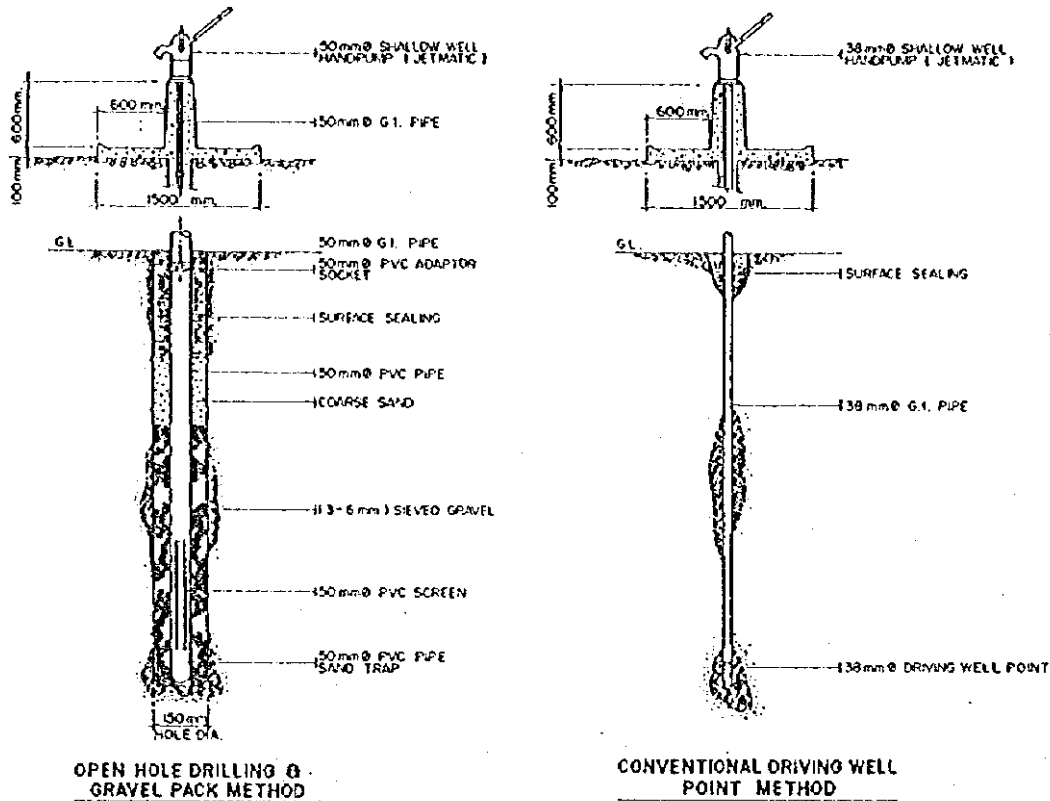
Municipality	1994					2000					2010				
	School Age Population	Total Enrollment		Public School Enrollment		School Age Population	Total Enrollment		Public School Enrollment		School Age Population	Total Enrollment		Public School Enrollment	
		Number	Participation Rate	Number	Participation Rate		Number	Participation Rate	Number	Participation Rate		Number	Participation Rate	Number	Participation Rate
Abra de Ilog	3,779	2,832	75	2,207	58	3,792	2,844	75	2,199	58	4,530	3,851	85	2,718	60
Calintaan	5,908	5,394	91	4,194	71	2,364	6,701	91	5,228	71	8,797	8,621	98	6,593	75
Looc	2,029	1,596	79	1,596	79	2,260	1,785	79	1,785	79	2,700	2,430	90	2,160	80
Lubang	5,128	4,098	80	3,258	64	6,396	5,117	80	4,093	64	7,641	6,377	90	4,967	65
Magsaysay	6,908	6,663	96	6,663	96	8,634	8,289	96	8,289	96	10,314	10,108	98	9,283	90
Mamburao (Capital)	7,050	6,360	90	5,920	84	9,391	8,452	90	7,888	84	11,219	10,995	98	10,097	90
Paluan	2,147	2,120	99	2,120	99	2,414	2,390	99	2,390	99	2,884	2,855	99	2,855	99
Rizal	7,699	5,600	73	5,600	73	9,867	7,203	73	7,203	73	11,787	10,608	90	8,605	73
Sablayan	14,850	12,057	81	4,587	31	19,147	15,509	81	5,936	31	22,873	21,729	95	9,149	40
San Jose	28,425	22,021	77	14,421	51	37,158	28,612	77	18,951	51	44,389	39,950	90	26,633	60
Sta. Cruz	5,449	4,403	81	4,403	81	7,018	5,685	81	5,685	81	8,384	7,546	90	6,791	81
Provincial Total	89,371	73,144	82	54,969	62	113,441	92,586	82	69,647	62	135,518	125,570	93	89,856	66

8.3.3 Projection of the Number of Public Utilities

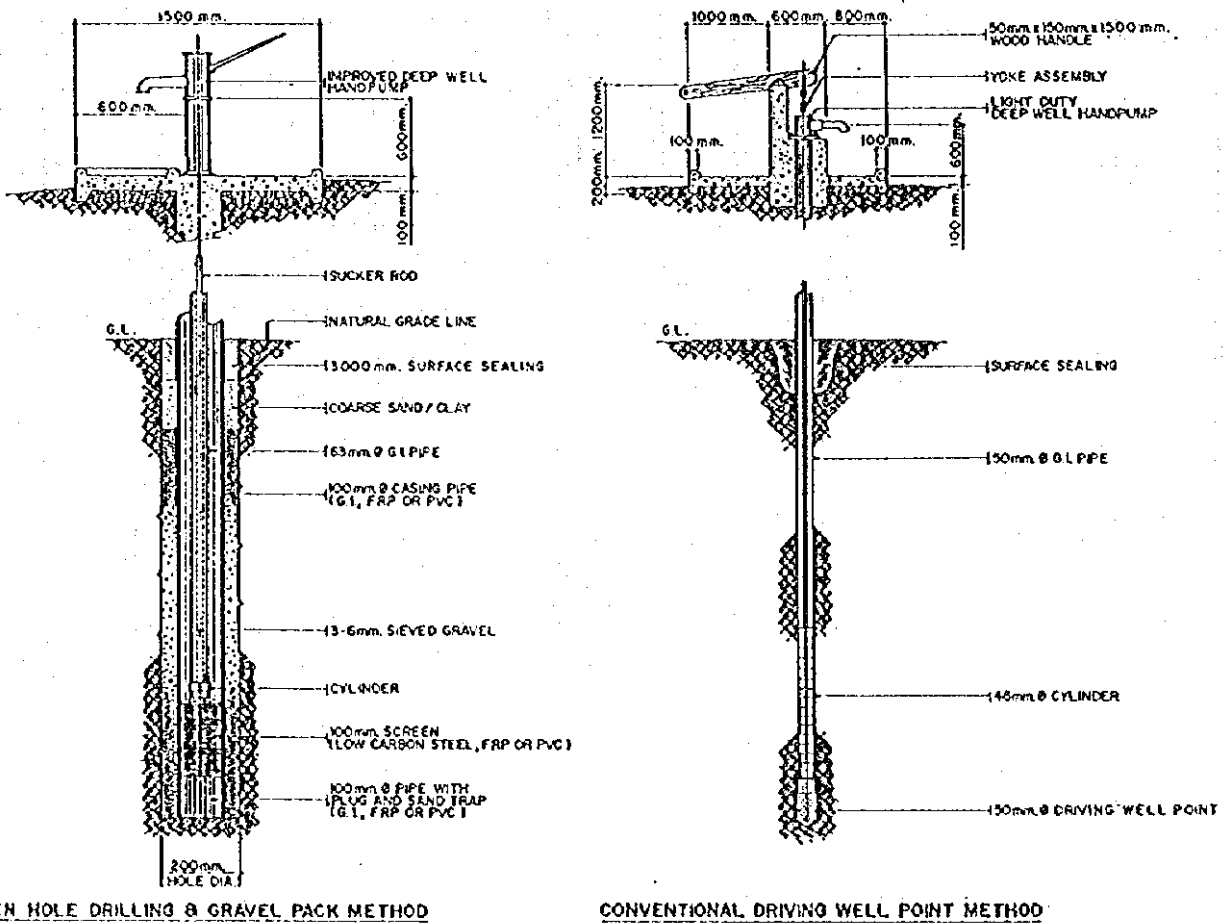
Table 8.3.7 Projected Number of Public Utilities by Municipality by Target Year

Municipality	Type	1994	2000		2010	
		No. of Public Utilities	Proposed Construction	Total	Proposed Construction	Total
Abra de Ilog	Public Markets	1	0	1	0	1
	Bus/Jeep Term.	0	1	1	0	1
	Total	1	1	2	0	2
Calintaan	Public Markets	0	1	1	0	1
	Bus/Jeep Term.	0	0	0	1	1
	Total	0	1	1	1	2
Looc	Public Markets	0	1	1	0	1
	Bus/Jeep Term.	0	0	0	1	1
	Total	0	1	1	1	2
Lubang	Public Markets	0	1	1	0	1
	Bus/Jeep Term.	1	0	1	0	1
	Total	1	1	2	0	2
Magsaysay	Public Markets	0	1	1	0	1
	Bus/Jeep Term.	0	0	0	1	1
	Total	0	1	1	1	2
Mamburao (Capital)	Public Markets	2	0	2	0	2
	Bus/Jeep Term.	0	1	1	0	1
	Total	2	1	3	0	3
Paluan	Public Markets	1	0	1	0	1
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	0	1	1	2
Rizal	Public Markets	0	1	1	0	1
	Bus/Jeep Term.	0	0	0	1	1
	Total	0	1	1	1	2
Sablayan	Public Markets	1	0	1	1	2
	Bus/Jeep Term.	0	1	1	1	2
	Total	1	1	2	2	4
San Jose	Public Markets	1	0	1	2	3
	Bus/Jeep Term.	0	1	1	1	2
	Total	1	1	2	3	5
Sta. Cruz	Public Markets	1	0	1	0	1
	Bus/Jeep Term.	0	0	0	1	1
	Total	1	0	1	1	2
Provincial Total	Public Markets	7	5	12	3	15
	Bus/Jeep Term.	1	4	5	8	13
	Total	8	9	17	11	28

8.4 Types of Facilities and Implementation Criteria
 8.4.1 Water Supply



SHALLOW WELLS

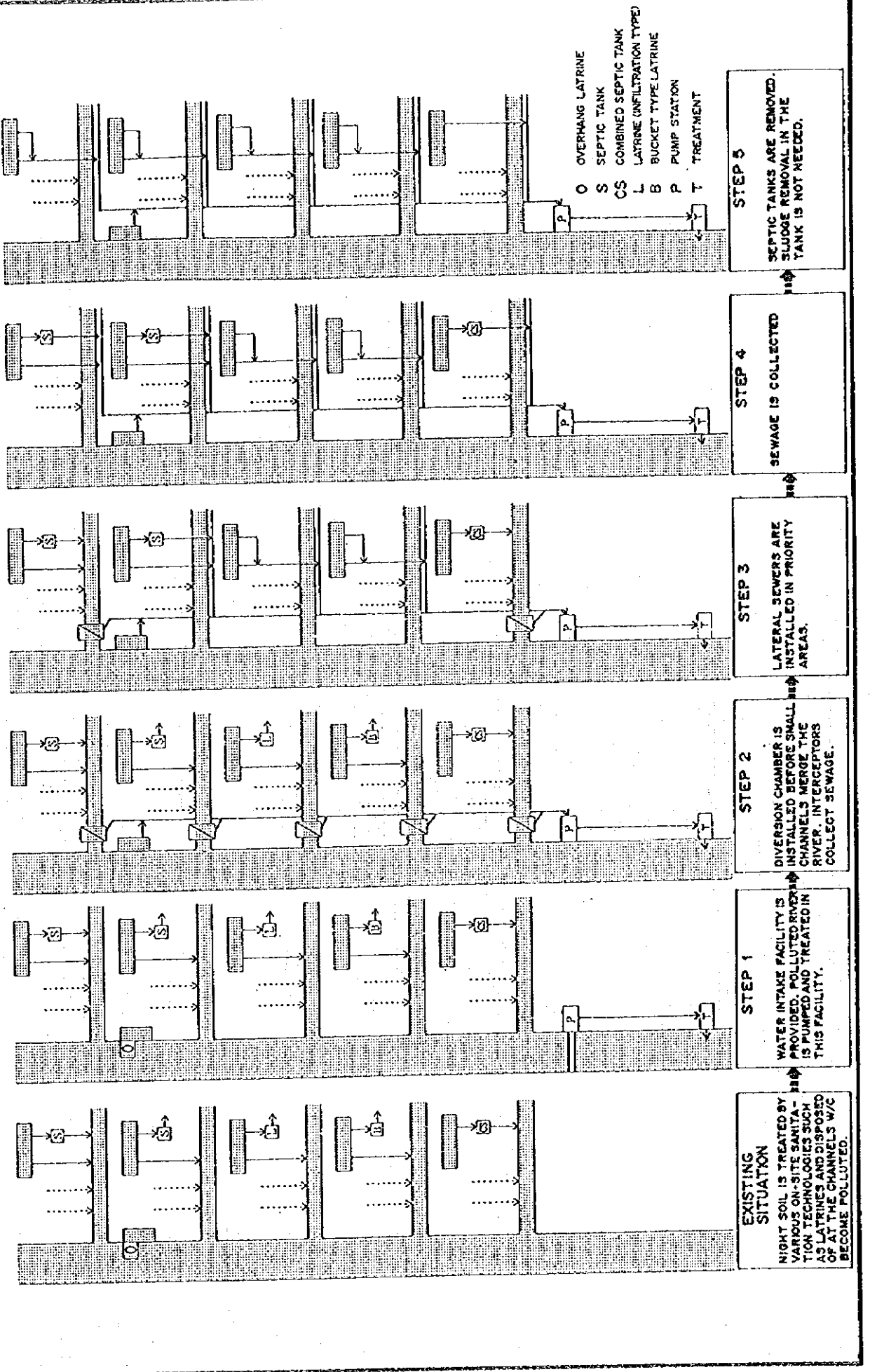


DEEP WELLS

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

No untapped spring sources was confirmed to be suitable for Level II systems in rural water supply by the time of PW4SP preparation. However, Table 8.5.1 was prepared as reference for future update of this PW4SP. Conditions and assumptions applied for this estimate are as follows:

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
Abra de Ilog	0	0	0	0
Calintaan	0	0	0	0
Looc	0	0	0	0
Lubang	0	0	0	0
Magsaysay	0	0	0	0
Mamburao (Capital)	0	0	0	0
Paluan	0	0	0	0
Rizal	0	0	0	0
Sablayan	0	0	0	0
San Jose	0	0	0	0
Sta. Cruz	0	0	0	0
Provincial Total	0	0	0	0

Source capacity:

The average source capacity of untapped spring was assumed to be capable to serve 150 households based on the review of existing Level II systems with spring sources.

Number of system:

One untapped spring was considered to serve one Level II system in one rural barangay.

(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)

Municipality	Type	Population Served in the Base Year				Total Population	Phase I Coverage (2000)							
							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
Abra de Ilog	Urban	1,354	0	49	1,403	1,816	1,403	1,354	0	49	0	0	0	0
	Rural	118	118	140	376	11,839	8,406	118	118	8,170	0	0	8,030	8,030
	Total	1,472	118	189	1,779	13,655	9,809	1,472	118	8,219	0	0	8,030	8,030
Calintaan	Urban	0	0	4,806	4,806	7,340	5,652	846	0	4,806	846	0	0	846
	Rural	0	0	9,786	9,786	15,244	10,823	0	0	10,823	0	0	1,037	1,037
	Total	0	0	14,592	14,592	22,584	16,475	846	0	15,629	846	0	1,037	1,883
Looc	Urban	0	0	17	17	4,570	3,519	3,502	0	17	3,502	0	0	3,502
	Rural	0	0	0	0	3,268	2,320	0	0	2,320	0	0	2,320	2,320
	Total	0	0	17	17	7,838	5,839	3,502	0	2,337	3,502	0	2,320	5,822
Lubang	Urban	3,731	0	0	3,731	7,131	5,491	5,491	0	0	1,760	0	0	1,760
	Rural	1,695	0	0	1,695	16,318	11,586	1,695	0	9,891	0	0	9,891	9,891
	Total	5,426	0	0	5,426	23,449	17,077	7,186	0	9,891	1,760	0	9,891	11,651
Magsaysay	Urban	1,316	102	917	2,335	8,658	6,667	5,648	102	917	4,332	0	0	4,332
	Rural	324	0	2,939	3,263	18,312	13,002	324	0	12,678	0	0	9,739	9,739
	Total	1,640	102	3,856	5,598	26,970	19,669	5,972	102	13,595	4,332	0	9,739	14,071
Mamburao (Capital)	Urban	8,952	235	292	9,479	13,723	10,567	10,040	235	292	1,088	0	0	1,088
	Rural	0	0	669	669	15,290	10,856	0	0	10,856	0	0	10,187	10,187
	Total	8,952	235	961	10,148	29,013	21,423	10,040	235	11,148	1,088	0	10,187	11,275
Paluan	Urban	0	1,848	534	2,382	5,117	3,940	1,558	1,848	534	1,558	0	0	1,558
	Rural	0	0	747	747	3,369	2,392	0	0	2,392	0	0	1,645	1,645
	Total	0	1,848	1,281	3,129	8,486	6,332	1,558	1,848	2,926	1,558	0	1,645	3,203
Rizal	Urban	0	0	0	0	2,485	1,913	1,913	0	0	1,913	0	0	1,913
	Rural	0	0	19,970	19,970	27,479	19,970	0	0	19,970	0	0	0	0
	Total	0	0	19,970	19,970	29,964	21,883	1,913	0	19,970	1,913	0	0	1,913
Sablayan	Urban	5,804	0	5,263	11,067	18,605	14,326	9,063	0	5,263	3,259	0	0	3,259
	Rural	178	561	23,598	24,337	41,412	29,403	178	561	28,664	0	0	5,066	5,066
	Total	5,982	561	28,861	35,404	60,017	43,729	9,241	561	33,927	3,259	0	5,066	8,325
San Jose	Urban	12,334	187	12,211	24,732	40,178	30,937	18,539	187	12,211	6,205	0	0	6,205
	Rural	0	345	29,350	29,695	74,231	52,704	0	345	52,359	0	0	23,009	23,009
	Total	12,334	532	41,561	54,427	114,409	83,641	18,539	532	64,570	6,205	0	23,009	29,214
Sta. Cruz	Urban	2,587	0	680	3,267	4,595	3,538	2,858	0	680	271	0	0	271
	Rural	1,118	0	4,964	6,082	16,879	11,984	1,118	0	10,866	0	0	5,902	5,902
	Total	3,705	0	5,644	9,349	21,474	15,522	3,976	0	11,546	271	0	5,902	6,173
Provincial Total	Urban	36,078	2,372	24,769	63,219	114,218	87,953	60,812	2,372	24,769	24,734	0	0	24,734
	Rural	3,433	1,024	92,163	96,620	243,641	173,446	3,433	1,024	168,959	0	0	76,826	76,826
	Total	39,511	3,396	116,932	159,839	357,859	261,399	64,245	3,396	193,758	24,734	0	76,826	101,560

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

Municipality	Type	Population Served in 2000				Phase II Coverage (2010)								
		Level III	Level II	Level I	Total	Total Population	Service Coverage			Additional Population to be Served				
							Total	Level III	Level II	Level I	Level III	Level II	Level I	Total
Abra de Ilog	Urban	1,354	0	49	1,403	2,333	2,170	2,170	0	0	816	0	0	816
	Rural	118	118	8,170	8,406	13,979	13,280	118	118	13,044	0	0	4,874	4,874
	Total	1,472	118	8,219	9,809	16,312	15,450	2,288	118	13,044	816	0	4,874	5,690
Calintan	Urban	846	0	4,806	5,652	9,632	8,958	8,958	0	0	8,112	0	0	8,112
	Rural	0	0	10,823	10,823	17,347	16,480	0	0	16,480	0	0	5,657	5,657
	Total	846	0	15,629	16,475	26,979	25,438	8,958	0	16,480	8,112	0	5,657	13,769
Looc	Urban	3,502	0	17	3,519	6,966	6,478	6,478	0	0	2,976	0	0	2,976
	Rural	0	0	2,320	2,320	2,397	2,320	0	0	2,320	0	0	0	0
	Total	3,502	0	2,337	5,839	9,363	8,798	6,478	0	2,320	2,976	0	0	2,976
Lubang	Urban	5,491	0	0	5,491	8,519	7,923	7,923	0	0	2,432	0	0	2,432
	Rural	1,695	0	9,891	11,586	19,494	18,519	1,695	0	16,824	0	0	6,933	6,933
	Total	7,186	0	9,891	17,077	28,013	26,442	9,618	0	16,824	2,432	0	6,933	9,365
Magsaysay	Urban	5,648	102	917	6,667	10,857	10,097	10,097	0	0	4,449	0	0	4,449
	Rural	324	0	12,678	13,002	21,361	20,293	324	0	19,969	0	0	7,291	7,291
	Total	5,972	102	13,595	19,669	32,218	30,390	10,421	0	19,969	4,449	0	7,291	11,740
Mamburao (Capital)	Urban	10,040	235	292	10,567	14,626	13,602	13,602	0	0	3,562	0	0	3,562
	Rural	0	0	10,856	10,856	20,034	19,032	0	0	19,032	0	0	8,176	8,176
	Total	10,040	235	11,148	21,423	34,660	32,634	13,602	0	19,032	3,562	0	8,176	11,738
Palcan	Urban	1,558	1,848	534	3,940	6,620	6,157	6,157	0	0	4,599	0	0	4,599
	Rural	0	0	2,392	2,392	3,517	3,341	0	0	3,341	0	0	949	949
	Total	1,558	1,848	2,926	6,332	10,137	9,498	6,157	0	3,341	4,599	0	949	5,548
Rizal	Urban	1,913	0	0	1,913	2,969	2,761	2,761	0	0	848	0	0	848
	Rural	0	0	19,970	19,970	32,826	31,185	0	0	31,185	0	0	11,215	11,215
	Total	1,913	0	19,970	21,883	35,795	33,946	2,761	0	31,185	848	0	11,215	12,063
Sablayan	Urban	9,063	0	5,263	14,326	29,395	27,337	27,337	0	0	18,274	0	0	18,274
	Rural	178	561	28,664	29,403	42,301	40,186	178	561	39,447	0	0	10,783	10,783
	Total	9,241	561	33,927	43,729	71,696	67,523	27,515	561	39,447	18,274	0	10,783	29,057
San Jose	Urban	18,539	187	12,211	30,937	47,996	44,636	44,636	0	0	26,097	0	0	26,097
	Rural	0	345	52,359	52,704	88,676	84,242	0	345	83,897	0	0	31,538	31,538
	Total	18,539	532	64,570	83,641	136,672	128,878	44,636	345	83,897	26,097	0	31,538	57,635
Sta. Cruz	Urban	2,858	0	680	3,538	5,028	4,676	4,676	0	0	1,818	0	0	1,818
	Rural	1,118	0	10,866	11,984	20,625	19,594	1,118	0	18,476	0	0	7,610	7,610
	Total	3,976	0	11,546	15,522	25,653	24,270	5,794	0	18,476	1,818	0	7,610	9,428
Provincial Total	Urban	60,812	2,372	24,769	87,953	144,941	134,795	134,795	0	0	73,983	0	0	73,983
	Rural	3,433	1,024	168,989	173,446	282,557	268,472	3,433	1,024	264,015	0	0	95,026	95,026
	Total	64,245	3,396	193,758	261,399	427,498	403,267	138,228	1,024	264,015	73,983	0	95,026	169,009

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	Poor Flush	VIP Latrine	Total		Household Coverage				Add'l. No. of Households to be Served			
							Flush	Poor Flush	VIP Latrine	Total	Flush	Poor Flush	VIP Latrine	Total
Abra de Ilog	Urban	141	159	0	300	378	141	204	6	351	0	45	6	51
	Rural	13	1,123	0	1,136	2,519	25	1,876	39	1,940	12	753	39	804
	Total	154	1,282	0	1,436	2,897	166	2,080	45	2,291	12	798	45	855
Calintaan	Urban	0	731	0	731	1,335	154	853	21	1,028	154	122	21	297
	Rural	0	2,060	0	2,060	2,932	0	2,212	45	2,257	0	152	45	197
	Total	0	2,791	0	2,791	4,267	154	3,065	66	3,285	154	274	66	494
Looc	Urban	0	345	0	345	1,063	229	573	16	819	229	228	16	474
	Rural	0	879	0	879	681	0	514	10	524	0	0	10	10
	Total	0	1,224	0	1,224	1,744	229	1,087	27	1,343	229	228	27	484
Lubang	Urban	424	635	0	1,059	1,621	424	874	25	1,323	0	239	25	264
	Rural	173	1,899	0	2,072	3,330	205	2,308	51	2,564	32	409	51	492
	Total	597	2,534	0	3,131	4,951	629	3,182	76	3,887	32	648	76	756
Magsaysay	Urban	129	1,173	0	1,302	1,698	366	915	26	1,307	237	0	26	263
	Rural	30	1,943	0	1,973	3,391	60	2,499	52	2,611	30	556	52	638
	Total	159	3,116	0	3,275	5,089	426	3,414	78	3,918	267	556	78	901
Mamburao (Capital)	Urban	755	945	0	1,700	2,801	755	1,510	43	2,308	0	565	43	608
	Rural	0	1,616	0	1,616	2,998	0	2,078	46	2,124	0	462	46	508
	Total	755	2,561	0	3,316	5,799	755	3,588	89	4,432	0	1,027	89	1,116
Paluan	Urban	0	168	285	453	1,066	230	575	16	821	230	407	0	637
	Rural	0	180	141	321	732	0	508	11	519	0	328	0	328
	Total	0	348	426	774	1,798	230	1,083	28	1,341	230	735	0	965
Rizal	Urban	0	0	0	0	487	105	262	7	374	105	262	7	374
	Rural	0	3,054	0	3,054	5,284	0	3,987	81	4,068	0	933	81	1,014
	Total	0	3,054	0	3,054	5,771	105	4,249	89	4,443	105	1,195	89	1,389
Sablayan	Urban	500	983	0	1,483	3,510	757	1,892	54	2,703	257	909	54	1,220
	Rural	18	4,895	0	4,913	8,120	35	6,092	125	6,252	17	1,197	125	1,339
	Total	518	5,878	0	6,396	11,630	792	7,984	179	8,955	274	2,106	179	2,559
San Jose	Urban	1,010	4,039	0	5,049	7,727	1,666	4,165	119	5,950	656	126	119	901
	Rural	0	9,123	0	9,123	14,006	0	10,569	216	10,785	0	1,446	216	1,662
	Total	1,010	13,162	0	14,172	21,733	1,666	14,734	335	16,735	656	1,572	335	2,563
Sta Cruz	Urban	0	424	0	424	821	177	443	13	633	177	19	13	209
	Rural	0	1,277	645	1,922	3,185	196	2,207	49	2,452	196	930	0	1,126
	Total	0	1,701	645	2,346	4,006	373	2,650	62	3,085	373	949	13	1,335
Provincial Total	Urban	2,959	9,602	285	12,846	22,507	5,004	12,266	347	17,616	2,045	2,922	330	5,292
	Rural	231	28,049	786	29,069	47,178	521	34,850	727	36,098	287	7,166	666	8,120
	Total	3,193	37,651	1,071	41,915	69,685	5,525	47,116	1,073	53,714	2,332	10,088	996	13,412

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)							
							Households Coverage				Add'l. No. of Households to be Served			
		Flush	Poor Flush	VIP Latrine	Total		Flush	Poor Flush	VIP Flush	Total	Flush	Poor Flush	VIP Flush	Total
Abra de Hog	Urban	141	204	6	351	583	274	274	0	548	133	70	0	203
	Rural	25	1,876	39	1,940	3,495	30	3,256	0	3,286	5	1,380	0	1,385
	Total	166	2,080	45	2,291	4,078	304	3,530	0	3,834	138	1,450	0	1,588
Calintaan	Urban	154	853	21	1,028	2,408	1,132	1,132	0	2,264	978	279	0	1,257
	Rural	0	2,212	45	2,257	4,337	0	4,077	0	4,077	0	1,865	0	1,865
	Total	154	3,065	66	3,285	6,745	1,132	5,209	0	6,341	978	2,144	0	3,122
Loooc	Urban	229	573	16	819	1,742	819	819	0	1,638	590	246	0	836
	Rural	0	514	10	524	599	0	563	0	563	0	49	0	49
	Total	229	1,087	27	1,343	2,341	819	1,382	0	2,201	590	295	0	885
Lubang	Urban	424	874	25	1,323	2,130	1,001	1,001	0	2,092	577	127	0	704
	Rural	205	2,308	51	2,564	4,874	424	4,157	0	4,581	219	1,849	0	2,068
	Total	629	3,182	76	3,887	7,004	1,425	5,158	0	6,583	796	1,976	0	2,772
Magsaysay	Urban	366	915	26	1,307	2,714	1,276	1,276	0	2,552	910	361	0	1,271
	Rural	60	2,499	52	2,611	5,340	81	4,939	0	5,020	21	2,440	0	2,461
	Total	426	3,414	78	3,918	8,054	1,357	6,215	0	7,572	931	2,801	0	3,732
Mamburao (Capital)	Urban	755	1,510	43	2,308	3,657	1,719	1,719	0	3,438	964	209	0	1,173
	Rural	0	2,078	46	2,124	5,009	0	4,709	0	4,709	0	2,631	0	2,631
	Total	755	3,588	89	4,432	8,666	1,719	6,428	0	8,147	964	2,840	0	3,804
Paluan	Urban	230	575	16	821	1,655	778	778	0	1,556	548	203	0	751
	Rural	0	508	11	519	879	0	827	0	827	0	319	0	319
	Total	230	1,083	28	1,341	2,534	778	1,605	0	2,383	548	522	0	1,070
Rizal	Urban	105	262	7	374	742	349	349	0	698	244	87	0	331
	Rural	0	3,987	81	4,068	8,207	0	7,714	0	7,714	0	3,227	0	3,727
	Total	105	4,249	89	4,443	8,949	349	8,063	0	8,412	244	3,814	0	4,058
Sablayan	Urban	757	1,892	54	2,703	7,349	3,454	3,454	0	6,908	2,697	1,562	0	4,259
	Rural	35	6,092	125	6,252	10,575	44	9,896	0	9,940	9	3,804	0	3,813
	Total	792	7,984	179	8,955	17,924	3,498	13,350	0	16,848	2,706	5,366	0	8,072
San Jose	Urban	1,666	4,165	119	5,950	11,999	5,640	5,640	0	11,280	3,974	1,475	0	5,449
	Rural	0	10,569	216	10,785	22,169	0	20,839	0	20,839	0	10,270	0	10,270
	Total	1,666	14,734	335	16,735	34,168	5,640	26,479	0	32,119	3,974	11,745	0	15,719
Sta Cruz	Urban	177	443	13	633	1,257	591	591	0	1,182	414	148	0	562
	Rural	196	2,207	49	2,452	5,156	279	4,568	0	4,847	83	2,361	0	2,444
	Total	373	2,650	62	3,085	6,413	870	5,159	0	6,029	497	2,509	0	3,006
Provincial Total	Urban	5,004	12,266	347	17,616	36,236	17,033	17,033	0	34,066	12,029	4,767	0	16,796
	Rural	521	34,850	727	36,098	70,640	858	65,545	0	66,403	337	30,695	0	31,032
	Total	5,525	47,116	1,073	53,714	106,876	17,891	82,578	0	100,469	12,366	35,462	0	47,828

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 Students 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
Abra de Ilog	800	2,199	660	0	660	2,715	1,359	699
Calintan	900	5,228	1,563	663	1,563	6,598	3,297	1,731
Looc	450	1,785	536	86	536	2,160	1,080	544
Lubang	750	4,093	1,228	478	1,228	4,967	2,484	1,256
Magsaysay	1,500	8,289	2,487	987	2,487	9,283	4,642	2,155
Mamburao (Capital)	900	7,888	2,366	1,466	2,366	10,097	5,049	2,683
Paluan	600	2,390	717	117	717	2,855	1,428	711
Rizal	750	7,203	2,161	1,411	2,161	8,605	4,303	2,142
Sablayan	700	5,936	1,781	1,081	1,781	9,149	4,575	2,794
San Jose	2,700	18,951	5,685	2,985	5,685	26,633	13,317	7,632
Sta. Cruz	700	5,685	1,706	1,006	1,706	6,791	3,396	1,690
Provincial Total	10,750	69,647	20,895	10,285	20,895	89,856	44,932	24,037

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

Municipality	Type	Coverage in 1994		Phase I Coverage (2000)			No. of PU with Sanitary Toilets in 2000	Phase II Coverage (2010)		
		No. of PU with Toilet Facilities	No. of PU with Sanitary Toilet	No. of PU with Toilets	Add'l. No. of Public Utilities with Sanitary Toilet	No. of PU with Sanitary Toilet		No. of PU with Toilets	Add'l. No. of Public Utilities with Sanitary Toilet	No. of PU with Sanitary Toilet
Abra de Ilog	Public Market	1	0	1	1	1	1	1	0	1
	Bus/Jeep Term.	0	0	1	1	1	1	1	0	1
	Total	1	0	2	2	2	2	2	0	2
Calintan	Public Market	0	0	1	1	1	1	1	0	1
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	0	0	1	1	1	1	2	1	2
Looc	Public Market	0	0	1	1	1	1	1	0	1
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	0	0	1	1	1	1	2	1	2
Lubang	Public Market	0	0	1	1	1	1	1	0	1
	Bus/Jeep Term.	1	1	1	0	1	1	1	0	1
	Total	1	1	2	1	2	2	2	0	2
Magsaysay	Public Market	0	0	1	1	1	1	1	0	1
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	0	0	1	1	1	1	2	1	2
Mamburao (Capital)	Public Market	2	0	2	1	1	1	2	1	2
	Bus/Jeep Term.	0	0	1	1	1	1	1	0	1
	Total	2	0	3	2	2	2	3	1	3
Paluan	Public Market	1	0	1	1	1	1	1	0	1
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	0	1	1	1	1	2	1	2
Rizal	Public Market	0	0	1	1	1	1	1	0	1
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	0	0	1	1	1	1	2	1	2
Sablayan	Public Market	1	1	1	0	1	1	2	1	2
	Bus/Jeep Term.	0	0	1	1	1	1	2	1	2
	Total	1	1	2	1	2	2	4	2	4
San Jose	Public Market	1	0	1	1	1	1	3	2	3
	Bus/Jeep Term.	0	0	1	1	1	1	2	1	2
	Total	1	0	2	2	2	2	5	3	5
Sta. Cruz	Public Market	1	0	1	1	1	1	1	0	1
	Bus/Jeep Term.	0	0	0	0	0	0	1	1	1
	Total	1	0	1	1	1	1	2	1	2
Provincial Total	Public Market	7	1	12	10	11	11	15	4	15
	Bus/Jeep Term.	1	1	5	4	5	5	13	8	13
	Total	8	2	17	14	16	16	28	12	28

Note: PU - Public Utilities