

6. PAST FINANCIAL PERFORMANCE IN WATER SUPPLY AND SANITATION  
 6.2 LGU's Past Financial Performance  
 6.2.2 Availability of Funds

Table 6.2.2 Past Internal Revenue Allotment for the Province of LEYTE

Item	1995	1995	1997	1998	1999
1. IRA to all municipalities (National total)	18,768,952,000	19,607,715,553	24,849,000,000	28,245,815,434	31,830,569,345
2. IRA by Municipality	538,133,096.00	581,183,047.00	727,510,829.40	852,527,629.00	1,027,209,105.00
1 Abuyog	21,724,730	23,303,816.00	28,324,489.10	33,312,602	39,626,278
2 Atangalang	11,839,330	12,804,466.00	16,601,250.95	19,232,450	22,617,925
3 Albuera	13,444,026	14,493,590.00	17,775,490.04	20,594,977	24,800,855
4 Babalingon	8,316,359	8,973,095.00	11,541,829.26	13,189,144	15,607,156
5 Barugo	8,979,910	9,726,224.00	12,431,874.91	14,187,235	16,912,447
6 Bato	9,506,307	10,322,836.00	12,855,219.23	14,679,229	17,430,699
7 Baybay	25,403,196	27,466,896.00	33,550,975.50	38,738,470	46,186,424
8 Burauen	15,693,914	16,967,180.00	21,372,812.70	24,660,527	29,382,141
9 Calubian	9,397,093	10,193,653.00	13,361,198.84	15,368,710	18,324,484
10 Capocan	10,170,122	10,981,553.00	13,884,386.28	16,022,795	19,107,019
11 Cangara	12,306,766	13,347,733.00	16,893,033.19	19,305,001	22,909,685
12 Dagara	8,899,464	9,656,553.00	12,151,977.56	13,814,717	16,340,170
13 Dulag	11,119,570	12,051,537.00	15,010,711.00	17,153,954	20,346,067
14 Hilongos	15,317,756	16,589,825.00	20,456,528.00	23,448,986	27,849,485
15 Hindang	7,156,911	7,753,777.00	9,373,895.00	10,674,653	12,640,832
16 Inopacan	7,709,880	8,336,372.00	10,687,270.00	12,232,160	14,517,258
17 Isabel	10,422,255	11,329,593.00	14,257,133.00	16,272,828	19,379,972
18 Jaro	12,168,131	13,141,089.00	16,159,498.00	18,594,199	22,108,970
19 Javier (Bugho)	8,784,381	9,482,007.00	12,194,255.00	14,045,438	16,730,411
20 Jutla	5,785,305	6,257,111.00	8,186,870.00	9,333,771	11,056,801
21 Kananga	11,907,395	12,921,522.00	16,167,568.00	18,607,074	22,213,938
22 Lapaz	6,855,844	7,430,450.00	9,604,419.00	10,982,864	13,039,154
23 Leyte	11,143,070	12,080,687.00	14,875,772.00	17,074,874	20,325,017
24 Macarthur	6,356,881	7,033,150.00	9,494,614.00	10,825,097	12,829,840
25 Mahaplag	8,989,289	9,719,204.00	12,172,294.00	13,929,565	16,530,630
26 Malag-Ob	7,547,912	8,155,003.00	10,441,384.00	11,970,832	14,218,862
27 Malalom	10,448,422	11,308,231.00	13,740,147.00	15,742,081	18,686,272
28 Mayoraga	7,100,700	7,644,152.00	9,560,567.00	11,026,508	13,122,374
29 Merida	8,657,490	9,383,995.00	11,700,205.00	13,415,410	15,964,067
30 Palo	13,687,667	14,786,521.00	19,010,720.00	21,849,528	25,972,495
31 Palompon	13,489,800	14,664,612.00	18,407,154.00	21,135,897	25,215,991
32 Pastrana	6,752,390	7,294,230.00	9,448,151.00	10,812,260	12,827,958
33 San Isidro	9,334,424	10,058,709.00	14,382,145.00	16,517,242	19,680,855
34 San Miguel	7,737,054	8,334,290.00	10,525,803.00	12,111,139	14,391,194
35 Santa Fe	6,313,317	6,825,375.00	8,896,354.32	10,114,384	11,946,697
36 Tabango	10,127,319	10,989,969.00	13,711,689.14	15,703,924	18,680,608
37 Tabonabon	4,857,434	5,259,000.00	6,728,537.31	7,625,444	9,000,204
38 Tacloban City (Capital)	119,233,472	127,849,393.00	155,464,012.00	195,905,776	246,841,277
39 Tanauan	11,787,507	12,789,453.00	16,170,298.27	18,395,693	21,758,689
40 Tolosa	6,061,285	6,573,805.00	8,340,349.21	9,449,039	11,154,104
41 Tunga	4,197,955	4,556,418.00	5,983,603.49	6,786,136	8,036,019
42 Villaba	11,398,008	12,344,057.00	15,394,354.08	17,693,003	21,047,541
3. % Share by Municipality	100.00	100.00	100.00	100.00	100.00
1 Abuyog	4.04	4.01	3.89	3.91	3.86
2 Atangalang	2.20	2.20	2.31	2.26	2.22
3 Albuera	2.50	2.49	2.44	2.42	2.39
4 Babalingon	1.55	1.54	1.59	1.55	1.52
5 Barugo	1.67	1.67	1.71	1.66	1.64
6 Bato	1.77	1.78	1.77	1.72	1.70
7 Baybay	4.72	4.73	4.61	4.54	4.50
8 Burauen	2.92	2.92	2.94	2.89	2.86
9 Calubian	1.75	1.75	1.84	1.80	1.78
10 Capocan	1.89	1.89	1.91	1.88	1.86
11 Cangara	2.29	2.30	2.32	2.26	2.23
12 Dagara	1.65	1.66	1.67	1.62	1.59
13 Dulag	2.07	2.07	2.06	2.01	1.98
14 Hilongos	2.85	2.85	2.81	2.75	2.71
15 Hindang	1.33	1.33	1.29	1.25	1.23
16 Inopacan	1.43	1.43	1.47	1.43	1.41
17 Isabel	1.94	1.95	1.95	1.91	1.89
18 Jaro	2.26	2.26	2.22	2.18	2.15
19 Javier (Bugho)	1.63	1.63	1.68	1.65	1.63
20 Jutla	1.03	1.03	1.13	1.09	1.06
21 Kananga	2.21	2.22	2.22	2.18	2.15
22 Lapaz	1.28	1.28	1.32	1.29	1.27
23 Leyte	2.07	2.08	2.04	2.00	1.99
24 Macarthur	1.18	1.21	1.31	1.27	1.25
25 Mahaplag	1.67	1.67	1.67	1.63	1.61
26 Malag-Ob	1.40	1.40	1.44	1.40	1.39
27 Malalom	1.94	1.95	1.89	1.85	1.82
28 Mayoraga	1.32	1.32	1.31	1.29	1.28
29 Merida	1.61	1.61	1.61	1.57	1.55
30 Palo	2.54	2.54	2.61	2.56	2.53
31 Palompon	2.51	2.52	2.53	2.48	2.45
32 Pastrana	1.25	1.26	1.30	1.27	1.25
33 San Isidro	1.73	1.73	1.59	1.54	1.52
34 San Miguel	1.44	1.43	1.45	1.42	1.40
35 Santa Fe	1.17	1.17	1.22	1.19	1.16
36 Tabango	1.85	1.85	1.88	1.84	1.82
37 Tabonabon	0.90	0.90	0.92	0.89	0.89
38 Tacloban City (Capital)	22.16	22.00	21.37	22.98	24.03
39 Tanauan	2.19	2.20	2.22	2.16	2.12
40 Tolosa	1.13	1.13	1.15	1.11	1.09
41 Tunga	0.78	0.78	0.82	0.80	0.78
42 Villaba	2.12	2.12	2.12	2.07	2.05

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
1. Municipal Development Finance (MDF)	<p>Multilateral lending sources for LGU projects have principally come from three main sources, the World Bank (WB), the Asian Development Bank (ADB) and the Overseas Economic Cooperation Fund of Japan (OECF). The funds have been channeled through the MDF, a revolving fund created by a Presidential Decree in March 1984 to consolidate the fragmented and uncoordinated borrowing and grant system to the LGUs. The MDF is administered by the Bureau of Local Government Finance (BLGF) under the DOF. Before the creation of the MDF, the donor agencies required a central agency for monitoring the foreign loans and grants. With the establishment of the MDF, a separate monitoring agency was no longer needed, and thus, the MDF became the conduit for foreign loans and grants. The MDF also played the role of a monitoring unit and project accounting support for foreign funds directed to the LGUs.</p>	<p>The MDF operates under the direction of a Policy Governing Board chaired by the DOF with three other Government agencies as members, i.e. the National Economic and Development Authority (NEDA), the Department of Interior and Local Government (DILG) and the Department of Budget and Management (DBM). The MDF consists of two major units, the Financial Unit, headed by the Executive Director of the BLGF and the Central Projects Office (CPO), the project implementation unit for each project located in participating agencies in the MDF. Aside from providing loans, the MDF also provides technical assistance to LGUs for project identification and feasibility studies and for other projects such as the Real Property Tax Administration Project, which assisted more than 800 LGUs in improving their real property tax collection.</p>	<p>The MDF was created as a revolving fund and made available to LGUs in undertaking their socio-economic development programs. It was active in providing loans to LGUs in the 1980s when the GF's stopped lending to the LGUs on account of mounting uncollectible accounts. During this time, the MDF channeled some P7.9 billion of long-term finance to LGUs. LGU projects that have benefited from assistance from the MDF include:</p> <ul style="list-style-type: none"> <li>• public markets</li> <li>• heavy equipment and machinery</li> <li>• bus terminals</li> <li>• slaughterhouses</li> <li>• drainage and waterworks</li> <li>• roads</li> <li>• solid waste</li> <li>• telephone systems</li> <li>• health centers</li> </ul> <p>At present, nine loans have been provided by the World Bank, ADB, OECF and Eximbank of Korea through the MDF.</p> <p>Total loans extended under the nine projects for all regions amounts to \$290 million (P10.7 billion at current exchange rates). The greater access by higher income LGUs to the MDF credit facility can be attributed to the requirement of financial capacity and the ability of the LGU to repay the loans. Other criteria also favor the higher income LGUs, such as urban population, minimum requirements, annual income and equity requirements, and commitment to establish a separate project office with full-time staff. Considering that the higher income LGUs have access to</p>	<p><b>Terms of Credit.</b> The MDF is, at present, the only source of credit finance that is offering long-term financing with a maturity period of 15-25 years. The interest rate is currently set at 2 percent above the weighted average interest rate of 61-90 day domestic time deposits. No collateral is required since the IRA intercept mechanism guarantees the loan repayment. Aside from providing loans, the MDF can also provide a package of a loan and a grant, which effectively lowers the LGU's borrowing costs. The loan component carries the terms and conditions set by the lender through the MDF. Because of the liberal terms of the MDF, particularly the long-term principal repayment feature, the MDF has been extremely attractive to LGUs.</p> <p><b>Funding Limitation.</b> At the moment, MDF funding to the LGUs is experiencing constraints for several reasons:</p> <ul style="list-style-type: none"> <li>• the increased demand for MDF credits by other developing countries,</li> <li>• funding limitations of the multilateral institutions that support the MDF,</li> <li>• constraints imposed by the government budgetary process, and</li> <li>• increasingly limited eligibility for MDF assistance to the Philippines due to the increased economic development of the country.</li> </ul> <p>First, the worldwide demand for MDF assistance and the increase in requirements by other less-developed countries in the world has constrained the availability of funds to meet the increased demand for MDF funds from the Philippines. The multilateral agencies, in the pursuit of poverty alleviation objectives, are shifting attention to poorer regions of the world such as Africa. Second, the multilateral institutions that support the MDF are experiencing funding limitations themselves and are encouraging LGUs to tap private sources of financing for development assistance worldwide. Third, the MDF's present lending capacity is constrained by the budgetary process of the Government. Each department of the national government observes a budgetary ceiling imposed by Congress and the Development Budget Coordinating Committee. In practice, the budget submission of the National Government departments, which include budgetary requests for MDF counterpart funds, are subject to the ceiling. Finally, as the Philippine economy progresses, its eligibility for increased MDF assistance is adversely affected, as one of the principal criteria for MDF assistance is the economic standing of the recipient country.</p>

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MDF (contd)			<p>other sources of funding, the Government, in implementing its new vision for LGU financing, is discussing with the multilateral financing agencies, re-focusing MDF assistance toward less creditworthy LGUs.</p>	<p><b>Assessment</b></p> <p>The MDF continues to be a major source of concessional credit finance for LGUs. Since its first loan (Municipal Development Project I of the World Bank), the MDF has been actively contributing to the economic development of LGUs by providing long-term financing for LGU projects. It is the long-term feature of MDF loans and the concessional rate that has attracted the LGUs. Lately, however, some LGUs have voiced concern regarding the long processing time of MDF loans. Therefore, steps need to be taken to streamline the approval process. At the same time, consistent with the new vision of the Government for LGU financing, the MDF is being re-oriented to be a more effective instrument in lending to lower class municipalities, which have limited access to private sources of capital. Reform of the MDF is being undertaken with World Bank assistance. Because of the favorable terms of MDF lending, the MDF is expected to continue to be attractive to LGUs for financing basic services.</p>
2. Local Water Utilities Administration (LWUA)	<p>In order to promote, develop and finance local water utilities, optimize public service water operations, and facilitate the improvement of local water services, the Local Water Utilities Administration (LWUA) was created in September 1972 under the Provincial Water Utilities Act. The LWUA is a specialized lending institution, which provides financing to water districts for water supply development, expansion and improvement. LWUA has evolved to be primarily a financing agency with the following functions:</p> <ul style="list-style-type: none"> <li>• provide loans to qualified local water utilities for their capital expenditure programs;</li> <li>• establish standards for local water utilities such as water quality, design and construction of new or additional facilities for water supply, treatment, transmission and distribution; and for wastewater collection, treatment and disposal.</li> </ul>			

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
LWUA (cont'd)	<ul style="list-style-type: none"> <li>furnish technical assistance and personnel training programs for local water utilities;</li> <li>effect systems integration, joint investments, water district annexation and de-annexation.</li> </ul> <p>LWUA has, over the years, on-lent funds from ODA sources at concessionary rates. LWUA has extended loans to rural waterworks and sanitation associations, which are non-stock, non-profit cooperative associations, and franchised to operate rural water supply systems in remote areas where access to a water district is difficult. Many water districts have benefited from low-interest, long-term loans of up to 25 years with ample grace periods. However, because of funding source constraints from its donor agencies, LWUA has not been able to accommodate funding requests from all the water districts. As a result, some water districts (Bulacan, Metro Cebu, Puerto Princesa and Batanes have turned to alternative sources of financing such as BOT schemes and joint ventures).</p>			
3. DBP	<p>Provide loans to qualified LGUs for projects which will enhance and facilitate the delivery of basic services to their constituents and at the same time, capture sizeable deposits from LGUs.</p>	<p>To qualify under the Program, the province, municipality or city shall:</p> <ol style="list-style-type: none"> <li>have beneficiary population of at least 10,000;</li> <li>perform important local, commercial, transportation, industrial, educational or similar activities;</li> <li>have gross annual average revenues of at least ₱3.0 million over the last three years;</li> <li>have balanced or surplus prospective income streams for the next three years (computation to be validated by the concerned RMT/Branch);</li> <li>have no adverse findings from banks and major suppliers both for the LGU and the current Chief Executive and Treasurer; and</li> </ol>	<ol style="list-style-type: none"> <li>Revenue-generating projects include, but not limited to public markets, slaughter-houses, transport terminals, municipal water systems, storage/refrigeration facilities, and hospital/health facilities which are self-liquidating;</li> <li>Projects under the PCCD-CEP are primarily designed for income generation by barangay residents who will be organized into 4 to 6 member groups which will be funded by the LGUs out of the loan proceeds from GFIs like DBM. Initially, the pilot operation will cover 40 pre-identified barangays located at the 20 priority provinces.</li> </ol>	<p><b>DBP Environmental Credit Facilities</b></p> <p>Environmental projects are actually eligible under all of DBP's credit facilities. Two of these facilities are dedicated to environmental credit funding. These are the Environmental Infrastructure Support Credit Program (or EISCP), and the Industrial Pollution Control Loan Project (or IPCLP). Both are policy-based lending programs to support investment projects of industrial enterprises in promoting the protection and enhancement of the quality of the environment.</p> <p><b>Environmental Infrastructure Support Credit Program</b></p> <p>EISCP is by far the most successful of all DBP's environmental credit facility. The project is actually just on its 1 and 1/2-year pilot stage with 5 Billion Yen (equivalent to about 1.4 Billion Pesos) funding from the OECF. Total loan approvals has reached ₱1.3 Billion, almost exhausting the total fund.</p>

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3. DBP	6. have shown efficiency in the collection of real estate and other local taxes based on the steady growth rates over the last three (3) years	<p>For the expanded operation, 4,000 out of 42,000 barangays will be targeted annually.</p> <p>2. Non-revenue generating projects include but are not limited to construction of roads and bridges, and acquisition of heavy equipment which are not intended to generate revenues but to enhance efficiency in the provision of services to their constituents</p> <p>4. The project to be financed shall have passed the first and second screening following the Simplified Screening Criteria of World Bank (available with DBP);</p> <p>5. The project to be financed shall be included in the approval of local development plan and public investment program (Local Government Code Section 296);</p> <p>6. The project shall be duly endorsed by the local council as evidenced by the relevant enabling resolution</p>	<p>With the success of EISCP, DBP is working with Japan's OECF to continue to extend a second tranche of the credit facility on a larger scale.</p> <p><b>Industrial Pollution Control Loan Project</b></p> <p>IPCLP is a DM 10 million credit facility entrusted to DBP by the KfW of Germany. Although smaller in amount, the IPCLP also offers concessional rates to industries, particularly the small to medium scale industries, who are intending to invest in environmental projects.</p> <p>More or less, both EISCP and IPCLP carry the same features, terms and conditions.</p> <p><b>Comparative Features of Environmental Infrastructure Support Credit Program and Industrial Pollution Control Loan Project</b></p> <p><i>Amount:</i> Yen 5.158 Billion (United Facility) DM 10 Million (United Facility)</p> <p><i>Loan Denomination:</i> Pesos</p> <p><i>Purpose:</i> To provide financial assistance to environmental investment projects for pollution abatement and promotion of industrial efficiency. To support investment projects of new and existing industrial firms for the reduction of pollution and reduction of utilization of natural resources</p> <p><i>Eligible Borrowers:</i> Filipino citizens or corporations organized under the laws of the Philippines at least 70% of whose capital is owned by citizens of the Philippines. Existing and new SMEs with pre-funding asset size of P60 million or less.</p> <p><i>Interest Rate to End-Users:</i> 11% fixed p.a.</p> <p><i>Tenor:</i> 3 to 15 years with a maximum grace period of 5 years. Up to 10 years with a maximum grace period of two (2) years.</p> <p><i>Loan Size:</i> 80% of total project cost Maximum of 70% of the total investment cost or P24 million whichever is lower.</p>	

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DBP (contd)				<p><i>Eligible Projects</i>  Four basic types of pollution control projects:</p> <ul style="list-style-type: none"> <li>• Pollution treatment</li> <li>• Pollution minimization / clean technology</li> <li>• Toxic and hazardous waste substance management</li> <li>• Solid waste management</li> </ul> <p>Investment in pollution reduction including improvement of occupational situation and/or the reduction of raw material inputs to cover waste minimization technology in industrial processes.</p> <p><b>THE CREDIT LOAN PROCESS</b></p> <p>All loan applications are accepted through the Lending Units at the Head Office and DBP Branches. The staff of these lending units have undergone training and are now familiar with the common environmental terms and practices. Lending Units advise applicants of the types of projects that are eligible for financing and conduct initial review of loan documents. All loan applications go through the usual credit evaluation at this stage.</p> <p>The Lending Units then request the Environmental Management Unit (EMU) for technical appraisal and evaluation of proposed projects. Sometimes, credit evaluation and technical appraisal are done simultaneously. EMU not only conducts paper review of the project but also site visits and inspection of the proposed project. The new thing here in this process, is that from mere evaluation of credit worthiness, EMU's endorsement and findings are now integrated into the CA submitted to proper authorities for credit approval. The project's impact and benefits are thus clearly presented. Along with the Account Officers, EMU also monitors progress of the project.</p> <p>2. Amount of Loan:</p> <p>a. Window III Loans</p> <ol style="list-style-type: none"> <li>1. Revenue-Generating Projects - The minimum-maximum loan limits shall be ₱1 million and ₱50 million, respectively, subject to periodic review by WINCOM, and with a minimum equity participation of at least 15% of the total project cost.</li> <li>2. PCCD-CEP Projects - ₱1.5 million per Barangay Business Center</li> </ol>

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
DBP (contd)				<p>b. <u>Loans Secured by Deposits</u> - Total project cost but not to exceed 50% of the ADB deposits of the past six-month period reckoned from the preceding month which shall be maintained during the term of the loan and covered by a "Hold Out Agreement"</p> <p>b. <u>Terms of Payment:</u></p> <p>a. <u>Window III Loans</u></p> <ol style="list-style-type: none"> <li>1. <u>Revenue-Generating Projects</u> - The term of the loan shall be kept within project requirements and projected cashflows. Maximum term of the loan is 12 years inclusive of a maximum grace period of 2 years. The loan shall be payable monthly, quarterly or semi-annually depending on the cash generation of the project.</li> <li>2. <u>PCCD-CEP Projects</u> - Maximum of 5 years inclusive of up to one year grace period payable quarterly. The on-lending terms from Barangay Business Centers to their respective group members is maximum of 2 years inclusive of up to 6 months grace period payable monthly.</li> </ol> <p>b. <u>Loans Secured by Deposits</u> - Maximum of five (5) years payable monthly</p> <p>c. <u>Interest Rate:</u></p> <ol style="list-style-type: none"> <li>a. <u>Window III Loans</u> - Variable and reviewable every January 1 and July 1 based on prevailing 91-day T-Bill rate plus two (2%) provided that the rate is not higher than "AAAAA".</li> <li>PCCDP-CEP - The LGU shall be charged 12% p.a. to be passed on to the BBC without spread. The on-lending rate by BBC is 14% p.a.</li> <li>b. <u>Loans Secured by Deposits</u> - Based on the formula prescribed in ALMA Circular No. 01-95 covering the Revised Guidelines from Loans Secured by Deposits.</li> </ol> <p>d. <u>Drawdown:</u> Drawdown shall be on one time or in multiple basis. The loan proceeds shall be credited to a special project account to be opened by the LGU with DBP, withdrawals of which shall be subject to approved operating guidelines of the loan.</p>

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DBP (contd)				<p>e. <b>Collateral Requirements:</b></p> <p><u>For Window III Loans:</u></p> <p>Loans with maturities beyond 5 years shall be secured by:</p> <ol style="list-style-type: none"> <li>Registered first real estate mortgage and/or registered first chattel mortgage in favor of DBP, with loan values based on existing DBP policy, subject to final verification by DBP.</li> <li>Such other collateral or security arrangements as may be acceptable to DBP.</li> </ol> <p>Loans with maturities of up to 5 years shall be on best effort basis. In addition, the following shall be obtained:</p> <ol style="list-style-type: none"> <li>Assignment of specified portion/amount of the LGU's Internal Revenue Allotment (IRA) in favor of DBP in an amount at least equivalent to one (1) amortization payment which shall be maintained while the loan is outstanding. For PCCD-CEP Projects, this would be sufficient;</li> <li>Assignment of profits or income from the project to be financed until the loan is fully paid;</li> <li>Endorsement in favor of DBP of insurance policies on mortgaged properties. The insurance shall be placed, based on sound value, by DBP, through its appointed insurance broker.</li> </ol> <p><u>For Loans Secured by Deposits:</u></p> <p>Project assets and deposit agreement with a minimum balance of 200% of the outstanding balance of the loan and shall automatically be applied to the loan in the event of default.</p> <p>f. <b>Other Conditions</b></p> <ol style="list-style-type: none"> <li>The LGU shall include appropriation for debt amortizations in its annual budget in accordance with the LGC until the loan shall have been fully paid.</li> <li>The LGU shall maintain Special Depository Account under the General Fund, where repayment of obligations to DBP shall take precedence after operating expenses of the project. Only when the debt amortizations have been satisfied will excess from part of the General Fund.</li> </ol>



Financing Source DBP (contd)	Objectives	Prequalification	Eligible Projects	Loan Features
				<p>c. The LGU shall open a CASA account for the assigned IRA with the understanding that DBP shall automatically offset the amortization for the period against this deposit account. A minimum balance equivalent to one amortization payment shall be imposed.</p> <p>d. The LGU shall execute a Deed of Undertaking making DBP its main depository bank.</p> <p>e. The LGU shall maintain a debt service cover of at least 1.2 times. Debt service coverage is defined as yearly revenue from all sources less operating costs and maintenance expenditures, divided by yearly debt service to all creditors.</p> <p>f. The LGU shall maintain constitute a Local Prequalification, Bids and Awards Committee (PBAC), which shall primarily be responsible for the conduct and prequalification of contractors, bidding, evaluation of bids and recommendation of awards concerning the Project, with at least one (1) DBP representative as an observer.</p> <p>g. The LGU shall constitute a Local Technical Committee, which shall primarily be concerned with providing technical assistance to the local PBAC, with at least one (1) DBP representative.</p> <p>h. The LGU shall commit to establish a project office with full-time staff and operating budget for project preparation/implementation.</p> <p>i. The LGU shall constitute and commission a competent consultancy firm to be tasked with validating and certifying the acceptability and compliance with the approved specifications of all acquired materials and supplies.</p> <p>j. The LGU shall only engage the professional services of such parties and commission such works as are customary for industrial development operations and projects similar to the financed project, which services must be reasonably priced, considering the quality and competence of the parties rendering them and in case of works, the technical quality and competitive costs of the same, if approved in writing by the DBP.</p> <p>k. The LGU shall submit resolution passed by the appropriate Sanggunian Board (Panlalawigan, Panlungsod or Pambayan) expressly authorizing the following.</p>

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
DBP (contd)				<p>I. The loan being contracted by the local Chief Executive;            1. The Authority of the Local Chief Executive (Governor or Mayor) to negotiate and enter into the contract of the loan applied for and to mortgage or assign or otherwise into a collateral agreement to secure the payment of the loan applied for;            2. The continuing assignment of the LGU's applicable portion of its IRA, realty taxes and all other revenues to DBP until the loan is fully paid;            3. The continuing assignment of profits or income from the project/economic undertaking to be financed until the loan is fully paid;            4. Authorization to the DBM for it to remit the IRA for deposit to the account of the LGU with DBP duly acknowledged/received by DBM, Manila;            5. The authority for the Mayor and/or Treasurer to open and maintain deposit account with DBP where its IRA and revenues shall be deposited during the term of the loan; and            6. Authority for DBP to debit the LGU's deposit account to cover payments of its loan obligation with the Bank.</p>
4. Philippine National Bank (PNB)	<p><b>Purpose of the Loan:</b></p> <p>I. To finance the establishment, development, or expansion of income generating projects such as:</p> <p>a) Revenue-Generating/Cost Savings</p> <ul style="list-style-type: none"> <li>• Public Market</li> <li>• Trading Center/Terminal</li> <li>• Water System (Construction/Expansion)</li> <li>• Asphalt Plant</li> <li>• Heavy Equipment</li> <li>• Telephone System</li> <li>• Commercial System</li> <li>• Slaughterhouse</li> <li>• Grains Procurement/Trading</li> <li>• Post-Harvest Facilities</li> </ul>	<p><b>Prospects for Commercial Bank Lending to LGUs.</b> Recently, commercial banks' attitude toward LGU financing has undergone a transformation. Some commercial banks now recognize that LGUs represent a potential market for credit lending because of the large financing requirements of LGUs associated with the devolution of basic services and infrastructure requirements. Other reasons for the attractiveness of LGUs as a growing market for commercial lending are:</p> <ul style="list-style-type: none"> <li>• the increase in LGUs' share of the national wealth;</li> <li>• presence of a legal framework for LGU financing;</li> <li>• flexibility and expanded borrowing powers of LGUs under the LGC;</li> </ul>		<p><b>Eligible Borrowers:</b></p> <ul style="list-style-type: none"> <li>• Municipality</li> <li>• City</li> <li>• Province</li> </ul> <p><b>Amount of the Loan</b>            The amount of the loan is equivalent to the project's requirement (100%) but not to exceed the aggregate of five time (5x) the sum of the 20% portion of the Annual regular income and the Annual Internal Revenue Allotment (IRA) share of the LGU.</p> <p><b>Term of Loan</b>            Maximum of seven (7) years provided that amortization shall be payable on a monthly or quarterly basis. A longer term may be considered by PNB Board of Directors, if justified.</p> <p><b>Interest Rate</b>            Interest rates shall be prime rate based subject to periodic interest resetting.</p>

Financing Source	Objectives	Prerequisite	Eligible Projects	Loan Features
PNB (contd)	b) Others <ul style="list-style-type: none"> <li>• Irrigation</li> <li>• Renovation/Const. Of City/Capital Town's Municipal Hall</li> <li>• Purchase of lots</li> <li>• Reclamation</li> <li>• Sports Complex</li> <li>• Diagnostic Equipment/Building</li> <li>• Road Construction/ Repair</li> <li>• Hospital Building with Pay Wards</li> <li>• School Building</li> </ul>	<ul style="list-style-type: none"> <li>• increasing financial sophistication of some LGUs (some provinces are exploring private foreign financial instruments), and</li> <li>• the growing market opportunity in financing LGU infrastructure requirements (some ₱20 billion are in the project pipeline of LGU BOT Projects).</li> </ul> <p>Commercial lending to LGUs will also get a boost from the establishment of the LGU Guarantee Corporation, which will guarantee commercial loans to LGUs. In the past, the lack of a guarantee facility was a major factor that inhibited commercial lending to LGUs as commercial banks were concerned with the certainty of repayment. As the guarantee facility will provide the repayment "comfort" to commercial banks, it is expected that private commercial lending to LGUs will finally develop.</p>		<p><b>Collaterals</b></p> <ul style="list-style-type: none"> <li>• Assignment of applicable regular income of the LGU. Internal Revenue Allotment share of LGU and Net Revenue generated by the project financed.</li> <li>• Chattel Mortgage of Equipment Financed by the Loan.</li> <li>• Real Estate of Local Government Units.</li> </ul> <p><b>Standard Conditions</b></p> <p>a. <b>Common Condition</b></p> <ol style="list-style-type: none"> <li>1. Submission of a Resolution of the Sangguniang Bayan/Panlungsod authorizing the loan and designating the Local Chief Executive (LCE) as the authorized signatory. The resolution should also contain the following:               <ol style="list-style-type: none"> <li>a) The continuing assignment to PNB of the project revenue if applicable, LGU's applicable portions of the Internal Revenue Allotment (IRA), realty taxes and all other revenues until the loan is fully paid;</li> <li>b) The authorization of the LGU to the Department of Budget and Management (DBM) for the remittance of all its IRA thru PNB for deposit to the LGU's account maintained with PNB;</li> <li>c) The duly notarized undertaking of the LCE and/or Treasurer to remit to PNB applicable portion of the LGU's realty taxes and other revenues on a monthly basis as payment of the amortizations on the loan;</li> <li>d) The authority for the LCE and/or Treasurer to maintain the LGU's deposit account with PNB wherein the project's revenues, the LGU's IRA and other revenues shall be deposited until the loan is fully paid and the PNB to debit the LGU deposit accounts to cover payment of its obligations;</li> <li>e) The duly notarized undertaking of the LGU to include in its annual budget its loan obligations with PNB.</li> </ol> </li> <li>2. Submission of the LGU's letter-authorization to the DBM for the latter to remit all IRA directly to PNB for deposit to the LGU's account with PNB until the loan is fully paid, duly acknowledged /received for DBM, Manila</li> </ol>
	2) To finance acquisition of property, plant, machinery, equipment, and necessary accessories for the implementation of the items enumerated in the preceding section			
	Note: Combination of revenue & non-revenue generating project in one loan package.			
	Philippine National Bank (PNB). Consistent with its mission of achieving an "enduring involvement in socio-civic endeavors that uplift the quality of life", the PNB is among the largest, most active institutions lending to LGUs. Until recently a CFL, PNB, which was privatized in May 1996, has total resources amounting to ₱197 billion as of the end of 1996. Its loans to LGUs have reached ₱11.4 billion as of end-March 1997 for 225 different projects.			

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
PNB (contd)	<p>The types of projects that were lent to LGUs include income-generating and cost-saving projects such as commercial centers, public markets, transport terminals, slaughterhouses, power generators, water systems, construction projects and acquisition of heavy equipment. Other projects supported by PNB lending include telecommunications facilities, grains procurement, and post-harvest facilities. Lending to the NCR accounted for 56% of the total amount (P6.3 billion).</p> <p>Luzon projects accounted for 26% (P3.0 billion), Visayas, 10% (P1.1 billion), and the rest was for Mindanao, 8% (P0.8 billion). On a per project basis, Luzon projects averaged P31.0 million per project; Mindanao, P22.2 million and the Visayas at P20.6 million per project.</p> <p>Majority of the loans lent to LGUs were for heavy equipment, infrastructure and public markets</p>			<p>2. Submission of a duly notarized certification by LGU that:</p> <ol style="list-style-type: none"> <li>the 20% limit provided under the law in the servicing of loan obligations have not been exceeded;</li> <li>Legible copies of the Loan Agreement and Security Agreement have been posted at the conspicuous place in the Municipality/City Hall/ Provincial Capitol;</li> <li>The proposed sources of repayment of the loan are available and not restricted by law.</li> </ol> <p>3. PNB shall continue to be the LGU's principle depository Bank until such time the loan is fully paid.</p> <p>4. Approval and confirmation by the Sangguniang Bayan/Panlungsod of the terms of the covering Credit Agreement and all other documents executed by the LCE in the implementation of the loan.</p> <p>5. Undertaking by the LGU that they will not incur additional obligations/ indebtedness without the written consent of PNB which consent will not be unreasonably withheld.</p> <p>6. Any amount in excess of the approved amount of loan shall be shouldered by the LGU.</p> <p>7. Subject to SEL Cir. 4-315/94 of May 17, 1994 on Interest Rate Setting and Adjustments.</p> <p>8. All insurable improvements financed by the loan shall be insured up to the full insurable value and policy endorsed in favor of the Bank.</p> <p>9. All applicable provisions of PNB's standard loan conditions and such other conditions our Legal Department may impose to protect the interest of the Bank.</p> <p>b. Loans for Machinery/Equipment/Vehicle</p> <ol style="list-style-type: none"> <li>Loan proceeds shall be paid directly to the supplier/seller of the equipment/ vehicle in an amount equal to the selling price or amount of the approved loan whichever is lower.</li> <li>If to be imported, the letter of credit shall be opened at the Bank and the loan proceeds be equivalent to the       <ol style="list-style-type: none"> <li>corresponding import bill upon negotiation computed at the prevailing selling rate at the time of negotiation.</li> </ol> </li> </ol>

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
PNB (contd)				<p>b) amount of the LC in case of cash LC computed at the prevailing selling rate on the LC opening date.</p> <p>1) LGU to execute a chattel mortgage on the equipment within 60 days upon acquisition.</p> <p>2) Submission of a duly notarized certification that all government policies rules and regulations in the award of the contract to the local supplier have been complied with.</p> <p><b>For Construction/Development Loans</b></p> <p>1) Releases shall be staggered basis which are to be made only upon presentation of progress report and billing certified by the project engineer and the Municipal/City/Provincial Engineer and approved by the project owner and to be validated by the Bank appraisers.</p> <p>2) Where the contract calls for a mobilization outlay, such amount for initial release shall not exceed 15% of the approved loan.</p> <p>3) Submission of a duly notarized certification that all government policies, rules and regulations in the award of the project to the contractor have been complied with.</p> <p>4) PNB shall have the option to buy or lease space of its choice for a branch site within the project to be financed.</p> <p><b>Terms of Credit.</b> Eligible loans for PNB financing under its LGU financing program include those, which finance the establishment, development or expansion of income-generating projects. Other projects that qualify include irrigation, construction of municipal halls, sports complex, medical diagnostic equipment, road construction, hospitals and school buildings.</p> <p>The maximum loanable amount can be as much as 100% of the project requirements but will not exceed the aggregate of five times the sum of the 20% portion of the annual regular income and the ISA share of the LGU. The term of the loan is generally</p>

Financing Source	Objectives	Prerequisite	Eligible Projects	Loan Features
PNB (contd)				<p>up to 7 years, but the Board of Directors may consider a longer term if justified. The interest rate is prime rate-based subject to periodic interest resetting. Collateral requirements can include the assignment of applicable regular income of the LGU, IRA share and the revenues generated by the project financed. Other collateral include the chattel mortgage of equipment financed by the loan and real estate mortgage on patrimonial property of LGUs.</p>
<p>5. Land Bank of the Philippines (LBP)</p>	<p>Created in 1963, the Land Bank of the Philippines (LBP), one of the top five universal banks in the country with total resources of some P134 billion, has been lending actively to LGUs over the years. It has a social mission of promoting countryside development and has been a major contributor to rural credit delivery in the Philippines. Though LBP's main portfolio of loans is in the agrarian sector, it has a very active LGU financing program consistent with its mission. Foremost in LBP's LGU financing program is its "Total Development Options - Unified Land Bank Approach to Development or TODO-UNLAD program." The program offers a comprehensive package of loans that links farmers' cooperatives, private companies, rural banks, non-governmental institutions and LGUs around an income generating project in a specific area.</p> <p>The Land Bank's LGU program has financed projects in various sectors amounting to over P1.6 billion as of March 1997, primarily in infrastructure, bus terminals, public markets, telecommunications, housing, water systems, road construction and traffic systems.</p>	<p>Pre-Release Requirements</p> <p>Loans to the LGU's shall be covered by the regular documentary requirements for regular loan accounts. In addition, the following documents shall be required.</p> <p>a. Borrowing Resolution. Passed by the Sangguniang Panglungsod and expressly:</p> <ul style="list-style-type: none"> <li>• Confirming, approving and ratifying all previous representations and warranties and all the terms and conditions of the loan, and authorizing the Local Chief Executive to sign all documents pertaining to the loan;</li> <li>• Designating the person authorized to negotiate and sign all documents pertaining to the loan;</li> <li>• Authorizing the mortgage/assignment for certain personal and/or real properties and declaring that the properties offered as collateral are patrimonial and not actually devoted to public use and prohibiting the conversion of said properties to public user or service;</li> <li>• Committing not to contract other loans/credits with other creditors/banks are to impair the LGU's paying capacity for the duration of the loan;</li> <li>• Directing the LGU Treasurer and the accountant to enter the loan in the appropriate books of the LGU.</li> </ul>		<p><b>Terms of Credit.</b> As mentioned in the previous paragraph, Land Bank lends to provinces, cities and municipalities that are rated medium-grade or higher. Using this criterion, some 960 LGUs are eligible for Land Bank assistance. Eligible loans finance local infrastructure and other socio-economic development projects under LGUs' local development plans. The maximum loan amount is based on the requirement of the project but does not exceed the "Net Borrowing Capacity" calculated for LGUs as defined in the Local Government Code. LGUs typically will contribute 25% of the total project cost; the terms of the loan will not exceed 5 years and the maximum grace period on principal is two years. Interest rate charged is the prevailing market rate. Collateral requirements can include a holdout on LGU deposits, real estate property, machinery and equipment and a deed of assignment on IRA, regular taxes or net income. The LGU lending program requirements and procedures of Land Bank are reproduced in Annex 4.</p>

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
LBP (contd)	<p>Majority of Land Bank lending to LGUs has been directed to infrastructure financing (61%). These projects included integrated development projects in Metro Manila and Metro Cebu consisting of roads, reclamation, ports, schools, municipal and commercial buildings, etc. The next major exposure of Land Bank was in heavy machinery (15%), which are used by LGUs in carrying out their development and infrastructure projects. Lending to construction projects amounted to 7% and the rest were for sport complexes, public markets, bus terminals and others. To assist Land Bank in making their investment decisions, it has developed a creditworthiness ranking system for LGUs. This system classifies LGUs into four credit categories.</p> <p>Land Bank utilizes a set of criteria for its LGU credit rating system, including financial capability, socioeconomic profile, political stability and the technical, economic and financial viability of the proposed project. About 17% of LGUs are classified by the LBP as prime clients and high grade, while 40% are classified as medium grade. Land Bank's lending policy is limited to LGUs with a medium-grade or higher classification.</p>	<p><b>Prequalification</b></p> <ul style="list-style-type: none"> <li>• Designating LBP as the LGU's major depository bank for IRA and for its other deposits which designation shall be revoked while the loan obligations remains outstanding and directing the LGU Secretary to provide a copy of this Resolution to DBM or other IRA-administering office;</li> <li>• Appropriating the amount for loan repayment on the LGU's annual budget until the loan, interest and other charges are fully paid;</li> <li>• Undertaking by the LGU to secure from DEM a written certification of its commitment to withhold the LGU's IRA in favor of LBP in the event of payment default;</li> <li>• Authorizing LBP to deduct for set-off and/or deduct amounts from any deposits or funds of the LGU with LBP and apply the same to the payment of the loan or any portion thereof, or interest and penalties thereon as may be deemed necessary to LBP.</li> </ul> <p><b>Processing Requirements</b></p> <ol style="list-style-type: none"> <li>a. Sangguniang Resolution authorizing the Local Chief Executive to negotiate a loan with LBP.</li> <li>b. Budget for the Current Year</li> <li>c. COA Audited Financial Statements for the past 3 years</li> <li>d. List of Elected Officials and Key officers</li> <li>e. Schedule of LGU's IRA for the past 2 years</li> <li>f. Feasibility Study</li> <li>g. Regular Documentary Requirements pertaining to offered collaterals</li> <li>h. For Projects involving Construction <ul style="list-style-type: none"> <li>• Cost estimates</li> <li>• Plans and specifications</li> </ul> </li> </ol>		

Financing Source	Objectives	Prerequisite	Eligible Projects	Loan Features
LBP		<ul style="list-style-type: none"> <li>• Bill of materials</li> <li>• Work program /schedule duly approved by the Local Chief Executive and the City/District Engineer</li> <li>• For Acquisition of Machinery and Equipment</li> <li>• List of Machinery and Equipment, its Description &amp; Estimated Cost based on Firm Quotation</li> <li>• Guarantee from the Dealers/ Suppliers as the Availability of Spare parts in the Local Market</li> </ul>		
6. Municipal Bond Flotation (MBF)	<p>Municipal bond flotation is another private source of debt financing that is generating a lot of interest from LGUs. Municipal bonds represent an additional source of financing for LGUs, which hitherto had not been tapped. To date, six LGU bond flotations have been successfully floated. The first one in infrastructure development (Cebu equity bonds), and the rest in housing</p>	<p><b>Legal Framework for Bond Flotations.</b> The 1991 Local Government Code allows, subject to the rules and regulations of the Bangko Sentral ng Pilipinas (BSP) and the Securities and Exchange Commission (SEC), to "issue bonds, debentures, securities, collateral, notes and other obligations to finance self-liquidating, income-producing development or livelihood projects pursuant to the priorities established in the approved local development plan or the public investment Provinces, cities and municipalities are authorized under the LGC to issue municipal bonds under two conditions: (i) the obligation should finance self-liquidating, income producing development or livelihood projects; and (ii) the projects to be financed must be in accordance with priorities established in the approved local development plan or the public investment program. Thus, at the moment, LGUs cannot utilize a bond flotation for recurrent obligations or general obligations of LGUs and other non-revenue earning expenditures such as the reconstruction of a city or municipal hall or payment of staff salaries.</p>		<p><b>Bond Flotations Issued.</b> The Province of Cebu pioneered LGU bond flotations in the country when they floated the first bond issue in July 1990 (Cebu Equity Bond Unit). The ₱500 million issue had a term of three years, tax free interest income at 16 percent and called for principal repayments in five (5) equal semi-annual installments in the form of class "A" shares of Cebu Property Ventures and Development Corporation (CPVDC), a joint venture of Cebu Province and Ayala Land, Inc. (ALI). Cebu had contributed land and ALI contributed cash for their shares in CPVDC. With the tax-free feature, the investors effectively earned 20% on their investment plus the capital appreciation prospects of the CPVDC shares.</p> <p>Since the Cebu bond flotation, there have been five more issues (all in the housing sector):</p> <ul style="list-style-type: none"> <li>• Victorias Pababay Bonds - Negros Occidental (₱8.0 million)</li> <li>• Legazpi Suerte Bonds - Albay (₱26.0 million)</li> <li>• Claveria Housing Bonds - Misamis Oriental (₱20.0 million)</li> <li>• Sto. Domingo Housing Bonds - Nueva Ecija (₱10.0 million)</li> <li>• Puerto Princesa Housing Bond Palawan (₱20.0 million)</li> </ul>



Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
MBF (cont'd)		<p>In addition, the LGU concerned is obligated to formally adopt a public investment program for the province, city or municipality, and the project to be financed through a bond flotation must be part of the public investment program. Bond flotations require endorsement/ approval of the BSP.</p> <p><b>National Government Guarantee.</b> In order to enhance the market prospects of bond flotations, some LGUs, such as the province of Palawan, have requested a national government guarantee for their planned foreign bond flotations. However, the national government is not empowered to grant a guarantee to LGU foreign bond issues by virtue of R.A. 4860 (Foreign Borrowings Act) which limits the issuance of sovereign guarantees to loans of government-owned or government-controlled corporations and government financial institutions. With regard to local bond flotations, there have been instances where a national government agency has guaranteed the obligations of an LGU. Of the five LGU housing bond issues floated in the country, four have carried a partial guarantee from the Home Insurance Guarantee Corporation (HIGC), a national government agency. The housing bond issue floated in Sto. Domingo, Nueva Ecija, however, did not carry an HIGC guarantee, but nevertheless was fully subscribed.</p> <p>For non-housing bond issues, it is unlikely that a National Guarantee would be granted primarily because such guarantees run counter to the principles laid down in the Local Government Code, i.e. with the increase in the share of LGUs in the national wealth, and allowing LGUs the freedom to obtain should financing from various sources, the LGUs assume responsibility for financing basic services and infrastructure requirements.</p>		<p>These bonds were issued on a taxable basis with interest rates ranging from 14 - 16%. The term of the issues ranged from 3 years. All issues carried the guarantee of HIGC except the Sto. Domingo housing bonds. A description of the bond issuance process is presented by the Multinational Investment Bank Corporation, one of the major underwriters in the municipal bond market. Since the bonds floated were of relatively small size and short in maturity, it is clear that additional incentives are needed to promote development of a broader municipal bond market. In this regard, the Government is taking concrete steps through its policy initiative, New Vision and Policy Framework for LGU Financing, to initiate policies that will develop the municipal bond market.</p>

Financing Source	Objectives	Prerequisite	Eligible Projects	Loan Features
MBF (cont'd)		<p>In addition, the Government's fiscal policy is to limit extension of guarantees in order to protect its fiscal position. Because of the absence of a National Government guarantee, one can surmise that only the most creditworthy LGUs would be able to successfully float the first few non-housing municipal bond flotations.</p>		
7. Build-Operate-Transfer (BOT)	<p>BOT or "Build-Operate-Transfer" is a project-financing scheme that uses private projects historically financed and implemented by the public sector.</p> <p>BOT schemes are generally characterized by the participation of the private sector as the major sponsor of the project. The private sector proponent is given the rights and privileges by the public sector (the LGU) to build and operate the facility, transferring the facility to the LGU after the concession period. One very important characteristic of BOT schemes is that they allow proper allocation of risks. The private sector proponent assumes certain risk, the design, construction and operating and maintenance risks.</p> <p>In addition, BOT schemes, by virtue of requiring little or no upfront investments, provide local governments with a viable vehicle to overcome their budgetary resource constraints and accelerate the implementation of infrastructure projects. With BOTs, local government units need not depend on financial assistance from the National Government. If a local government unit can develop and package a financially viable project, it only needs</p>	<p>Legal Framework of the LGU BOT Scheme. The Local Government Code of 1991 allows the LGUs to tap both Government and private sources of capital to finance basic services, local infrastructure and other development projects. Realizing that the cost of financing these services and infrastructure projects is huge and considering that the Philippines had a highly successful BOT program at the national level, the LGC made specific and liberal provisions for the use of BOT schemes by LGUs. Section 302 of the LGC states: "Local government units may enter into contracts with any duly pre-qualified individual contractor for the financing, construction, operation and maintenance of any financially-viable infrastructure facility, under the build-operate-transfer agreement, subject to the applicable provisions of RA 6957, as amended by R.A. 7718 (the BOT Law).</p> <p>Coverage of LGU BOT Scheme and LGU BOT Pipeline. In the late 1980s and early 1990s, the BOT scheme was the Government's answer to solving the power crisis. Since then, the BOT scheme has been utilized to finance other infrastructure projects at the national level (transportation, information technology and water). Under the BOT law, LGUs would be able to utilize the BOT scheme in many sectors so long as they are revenue-generating.</p>		<p><b>Characteristics:</b></p> <ul style="list-style-type: none"> <li>• A private company or consortium is given the right to build and operate a facility previously provided for by the government</li> <li>• The private company is responsible for financing, design, constructing, operating and maintaining the project.</li> <li>• Lenders look to the projects assets and revenue stream for repayment; Concession period is agreed typically (20-25 years) after which the facility is transferred to the LGU.</li> </ul> <p><b>Advantages:</b></p> <ul style="list-style-type: none"> <li>• BOT offers an alternative source of financing.</li> <li>• A transparent legal framework already exists for BOT financing.</li> <li>• LGUs benefit from a project with a typical no or very little initial investment.</li> <li>• BOT schemes offer proper allocation of risks.</li> <li>• BOT projects usually result in better and reliable service and consistent supply.</li> <li>• Long concession period and contractual agreements assure project sustainability.</li> <li>• Technology and skills transfer usually result from BOT projects.</li> <li>• BOT Projects may stimulate local capital market development.</li> </ul>

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
<p>BOT (contd)</p>	<p>to solicit investor interest in the project and undergo the processing procedures prescribed under the BOT Law and the LGC.</p>	<p>Thus far, BOT schemes are being planned for infrastructure requirements in the LGUs such as water supply and sewerage, solid waste management, commercial centers, public markets, slaughterhouses, and telecommunications. One example of a successful LGU project implemented under a BOT scheme is the Mandaluyong Public Market.</p> <p>Concerning nationwide LGU BOT projects, there are a number of projects in an advanced development stage. These projects are in the following areas: bulk water supply, solid waste management, public markets, slaughterhouse, integrated bus terminals, and commercial complexes. The largest projects are the Batangas Water Supply Project which is at the conceptual stage (\$275 million), the Metro Manila Solid Waste Management Project under negotiation (US\$270 million), the Metro Cebu Water Supply Project (\$110 million) and the Bulacan Bulk Water Supply Project (\$50 million). There are eight projects in an advanced stage of development with a project cost of US\$188 million or about #7 billion, consisting of commercial centers, public markets, a waste recycling plant, slaughterhouse, solid waste management and a combined power and water supply project. In addition, there are 21 other short listed projects amounting to \$690 million or about #27.6 billion, which are in various stages of processing.</p>	<p><b>Joint Ventures</b></p> <p>Many LGUs also contemplate on entering into joint venture partnerships with the private sector. Indeed, what is required in a joint venture undertaking is the consummation of the legal agreements</p>	<p><b>Others Forms of Private Sector Participation in LGU Infrastructure Projects</b></p> <p>Aside from BOT schemes and the innovative provincial equity funds, there are other forms of private sector participation in LGU infrastructure projects (mostly in the water sector) which have improved service delivery and facilitated increased access to finance for new investments. It shows how responsibility for</p>
<p>8. LGU Guarantee Corporation (LGUGC)</p>	<p>Aware of the funding problems besetting the LGUs, particularly their limited access to commercial finance, the Development Bank of the Philippines (DBP) and the Bankers Association of the Philippines (BAP) took the initiative in establishing the LGU Guarantee Corporation (LGUGC).</p>	<p>The establishment of the LGUGC was necessitated by the inability of LGUs to access private sector funding chiefly because of the perception of lack of creditworthiness and political succession risk. To mitigate these "perceived" risks, the DBP and the BAP composed of some 53 different universal and commercial banks operating in the country.</p>	<p><b>Joint Ventures</b></p> <p>Many LGUs also contemplate on entering into joint venture partnerships with the private sector. Indeed, what is required in a joint venture undertaking is the consummation of the legal agreements</p>	<p><b>Others Forms of Private Sector Participation in LGU Infrastructure Projects</b></p> <p>Aside from BOT schemes and the innovative provincial equity funds, there are other forms of private sector participation in LGU infrastructure projects (mostly in the water sector) which have improved service delivery and facilitated increased access to finance for new investments. It shows how responsibility for</p>

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features	
LGUCC (cont'd)	<p>The LGUCC is expected to enhance the flow of commercial funds to the LGUs, and play a "catalytic" role by providing a guarantee on loans and credits granted to LGUs from commercial funding sources, and to municipal bond flotations.</p> <p>Ultimately, the LGUCC will enable LGUs to expand their borrowing capacity, develop their ability to issue a variety of credit instruments, reduce their financing costs and improve their operating flexibility. The LGUCC's implementing rules and regulations, guidelines and by-laws are being drafted, and formal incorporation was completed in March 1998. It is expected that the guarantee facility will begin operations by the mid-part of 1998.</p>	<p>established the LGU Guaranty Corporation to guarantee loans and credits granted by participating member commercial banks for various capital investment projects of LGUs. The joint venture partnership between DBP and the BAP is geared towards accelerating the competitive access of LGUs to financial markets, especially private sector credit. So far, twenty local banks and three foreign banks have signed up as participating investing banks. The specific objectives of the LGUCC are as follows:</p> <ul style="list-style-type: none"> <li>• expand the LGUs' borrowing capacity and credit availability;</li> <li>• reduce the LGUs' financing costs;</li> <li>• improve the operating and financial flexibility of the LGUs;</li> <li>• reduce the credit and other perceived risks (e.g. political risk) of lenders; and</li> <li>• contribute to the development of the local capital market by creating a market for a variety of credit instruments.</li> </ul>	<p>and once the financing and the contractors are in place, the project can commence. However, joint ventures do not have any specific legal framework at the moment such as the one for BOTs, which makes the arrangement subject to potential legal difficulties. In companion, BOT schemes have the legal framework with its own specific law and implementing rules and regulations, mitigating the likelihood of a protracted legal challenge if legal issues arise</p>	<p>certain functions are allocated, such as asset ownership and how these different schemes impact on certain parameters such as level of investments by LGUs and consumer tariffs. These schemes vary in the type of private sector participation:</p> <ul style="list-style-type: none"> <li>• <b>Service contracts</b> are short-duration engagements for specific tasks to be undertaken by the private sector participant. The purpose is to utilize certain expertise considered to be more cost-effectively undertaken by the private sector. Overall coordination remains to be the function of the utility.</li> <li>• <b>Management contracts</b> have a longer term duration giving the private sector a larger operational role in the utility. Similar to the purposes of service contracts but in more expanded form, management contracts allow the private sector to introduce efficiency in operations (usually through performance objectives) for a management fee. Responsibility for investments remain with the Government.</li> <li>• <b>Leases or affermage contracts</b> allow the private sector to lease the assets of a utility and takes on the responsibility for operating and maintaining them. The contractor (lessor) makes lease payments to the utility in exchange for the operation of the assets and the revenue collections from operations. Similar to management contracts, responsibility for investments remain with the Government.</li> <li>• <b>Concessions</b> give the private sector the right to operate and maintain the assets of the utility and to make necessary investments in exchange for fixed concession payments paid to the utility or the Government.</li> <li>• <b>BOT contracts</b> give the private sector the right to build, operate and transfer the facility to the utility or the Government after a fixed period of time (see section on BOT schemes).</li> <li>• <b>Divestiture</b> involves the outright sale of a utility's assets to the private sector.</li> </ul>	<p>It is important that the LGUs truly understand the different forms of private sector participation and evaluate which of these schemes is most suitable and cost-effective for achieving their objective of improving the delivery of basic services.</p>

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
9. NDC - Agri-Agra Erap Bonds	<p>Auction Date: April 15, 1999            Issue Size: ₱5.0 billion            Interest Rate: 7.875%            Reception : Oversubscribed amount tendered is five times the ₱5.0 billion bonds available, with significant participation by the foreign banks.</p>		<p><b>Project Selection/Evaluation Criteria</b>            NDC is open to partnership with the private sector. The projects should conform with the following set of guidelines:</p> <ol style="list-style-type: none"> <li>1. The project should be for agri-agra development.</li> <li>2. It should be in accordance with any or in support of development framework such as the Development Plans of the NEDA, DRIVE and Regional Growth Areas Development of DTI, Investment Priorities Program of BOI, Priority Investment Program of DA, DAR and NDC, or the Sectoral Development Plans mandated by law.</li> <li>3. It should be larger than those classified under the Small and Medium Enterprises with a project cost greater than ₱60 million.</li> <li>4. It should be ready for implementation with identified specific site, with definite proponent and is accessible to major infrastructure.</li> <li>5. The project selection shall ensure diversity of products, sectors, and geographical location.</li> <li>6. Preference will be given to project that utilize proven modern technology and have proven modern technology and have program for technology transfer to the farmers and/or project beneficiaries.</li> <li>7. The project should directly or indirectly benefit farmers and marginalized communities in line with the "ERAP Para sa Mahirap thrust.</li> <li>8. It should have an IRR of at least 18% with reasonably short payback period and an economic rate of 15% based on NEDA's Economic Evaluation Procedure.</li> <li>9. The proponents should be able to show its financial capability and ability to access market of product.</li> <li>10. The project should have a clear exit mechanism for NDC.</li> <li>11. It should be environment-friendly and have necessary environmental controls.</li> </ol>	



## 7. WATER SOURCE DEVELOPMENT

### 7.3 Groundwater Sources

#### 7.3.2 Groundwater Availability in the Province

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

The Groundwater Availability Map was prepared using the following information and reference (detailed list of reference is presented in Table 7.1.2, Data Report):

- 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 with a scale of 1:1,000,000.
- Water Resource Investigation conducted by NWRB, 1986.
- Well Inventory Database prepared by NWRB, LWUA and DPWH.
- Well Inventory Database in the province.
- General information on groundwater condition by DPWH-DEO and PPDO.
- Well Log Data by DPWH-DEO and PEO.
- Water source information by Water Districts.

##### (2) Approach and Methodology

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

- 1) Prepare a base map with an approximate scale of 1:700,000 (fit to the A4 map size). The topographical map of NAMRIA (1:250,000) was used as a reference map. Basic information including rivers and provincial and municipal boundaries are indicated in the prepared base map.
- 2) The groundwater potential areas, based on the geology of the province, are delineated on the base map. The Recent alluvial and/or beach deposits, Pliocene-Quaternary sedimentary formation (clay, silt, sand and gravel) and Pliocene-Quaternary volcanic rock units (pyroclastics, debris flow and tuff) are regarded as possible aquifers considering their high porosity and permeability.

Boundaries between groundwater development potential area and difficult area were defined and delineated as presented in Figure 7.3.1, Main Report.

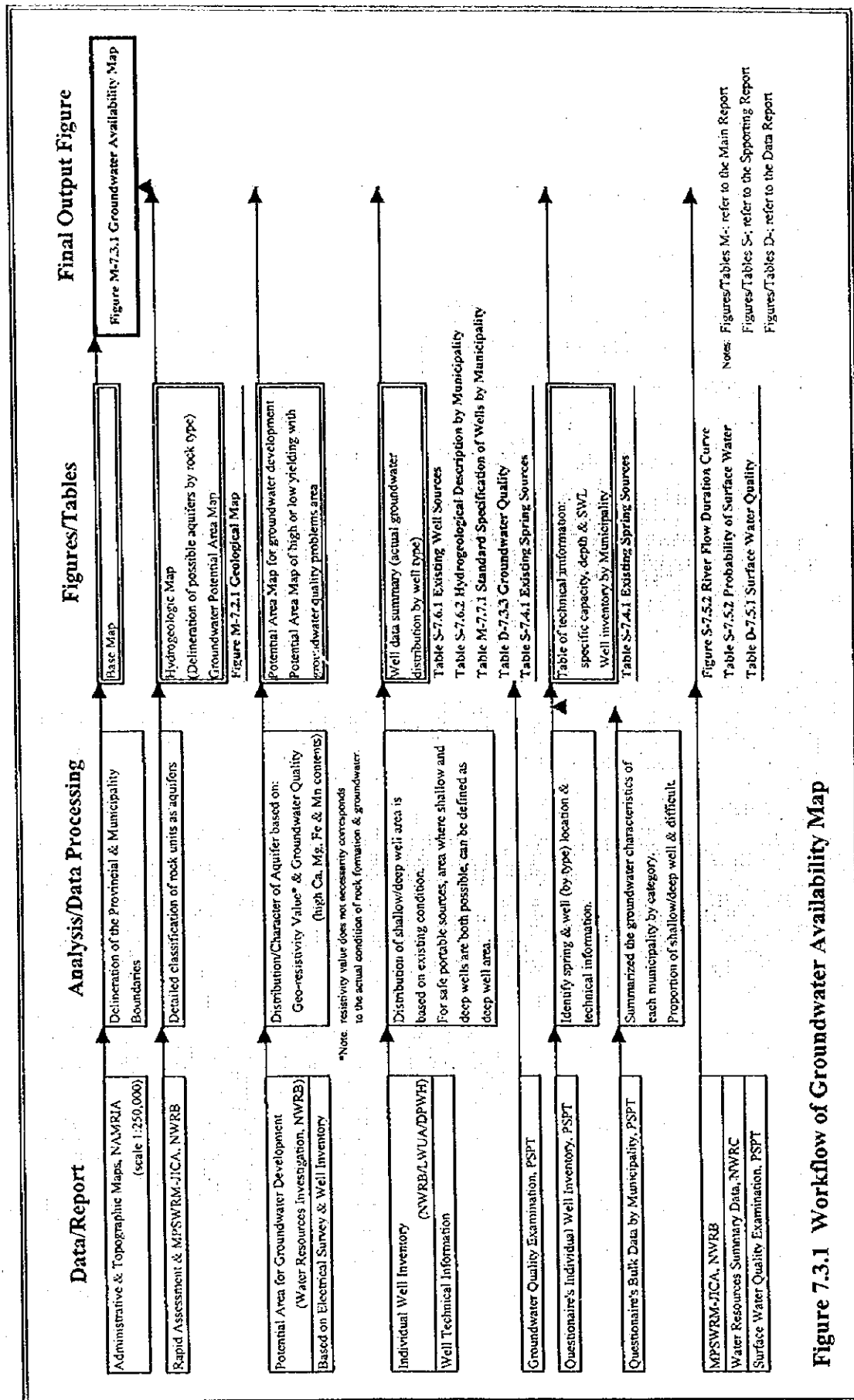


Figure 7.3.1 Workflow of Groundwater Availability Map



- 3) Areas with potential high yielding aquifer in the Water Resources Investigation of NWRB, are reflected in the defined groundwater potential areas.

Based on the results of electric resistivity survey of the above investigation, resistivity values from 20 to 210 ohm-meter indicate a potential high yielding formation. Values less than 10 ohm-meter suggest clayey layer. Figure 7.3.1, Main Report, shows the boundaries of areas with high and low yielding aquifers.

- 4) Delineate shallow and deep well areas based on well database of NWRB and DPWH central office, well inventory of DPWH-DEO and rock distribution. Figure 7.3.2 presents the categorization in terms of groundwater utilization.

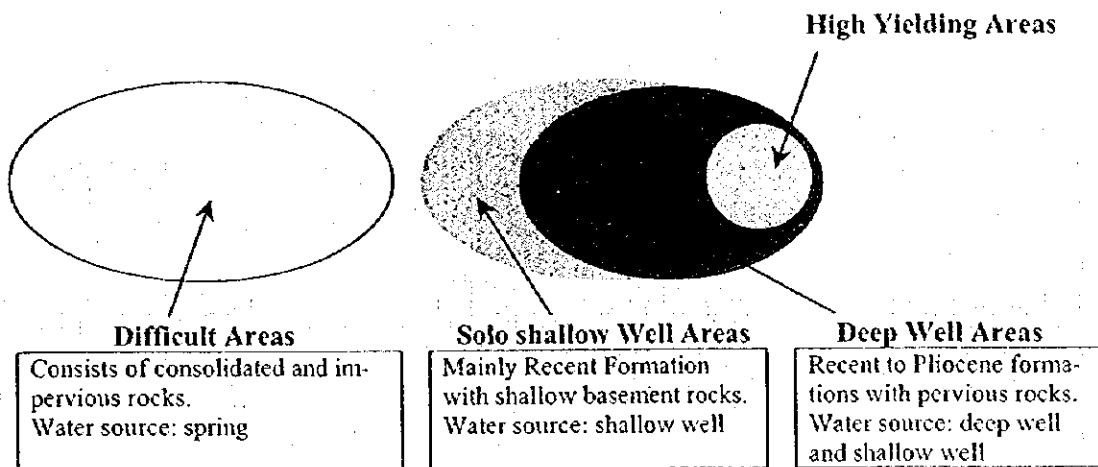


Figure 7.3.2 Area Category by Groundwater Utilization

Solo shallow well areas are defined on the following basis:

- Predominance of serviceable shallow wells and presence of deep wells with water quality problem and/or low yielding aquifers.
- Occurrence of impervious rocks beneath the Recent formation at shallow depth.

- 5) Based on the information provided by NWRB's well inventory and the data obtained through the questionnaires, well specification for each municipality is established as shown in the map. These specifications are used as references in evaluating the groundwater availability in each locality. Individual well locations with technical information are presented in Figure 7.6.1, Data Report.

(3) Future Updating and Utilization of the Map

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

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

#### 7.4 Spring Sources

The numbers and discharge of developed and untapped springs by municipality are shown in Table 7.4.1. The data are derived from the questionnaires and Table 7.1.1 Water Source Information, Data Report.

**Table 7.4.1 Existing Spring Sources**

Municipality/City	No. of Developed Spring		Untapped Spring		
	Q<2.8lps	Q>2.8lps	No.	Ave. lps	Range lps
Abuyog	0	0	0		~
Alangalang	0	54	0		~
Albuera	4	1	0		~
Babatngon	7	5	0		~
Barugo	7	0	0		~
Bato	7	0	5	34.0	10.0 ~ 60.0
Baybay	43	12	40	1.5	0.2 ~ 5.0
Burauen	0	14	14	2.9	1.5 ~ 10.0
Calubian	8	0	0		~
Capocan	20	0	4	2.4	0.5 ~ 8.0
Carigara	0	5	0		~
Dagami	2	0	11	0.7	0.5 ~ 1.2
Dulag	0	0	0		~
Hilongos	0	5	1	0.2	0.2 ~ 0.2
Hindang	0	7	7	42.1	30.0 ~ 60.0
Inopacan	0	11	6	17.5	15.0 ~ 20.0
Isabel	7	0	13	3.0	1.5 ~ 5.0
Jaro	0	19	1	3.0	3.0 ~ 3.0
Javier	0	11	10	9.4	2.0 ~ 30.0
Julita	0	0	0		~
Kananga	8	1	1	0.5	0.5 ~ 0.5
La Paz	5	1	19	0.5	0.5 ~ 0.5

Table 7.4.1 Existing Spring Sources

(cont'd)

Municipality/City	No. of Developed Spring		Untapped Spring		
	Q<2.8lps	Q>2.8lps	No.	Ave. lps	Range lps
Leyte	16	1	1	0.2	0.2 ~ 0.2
Mac Arthur	2	2	2	0.5	0.5 ~ 0.5
Mahaplag	12	0	2	0.8	0.5 ~ 1.0
Matagob	11	9	4	13.9	5.0 ~ 28.4
Matalom	3	4	15	2.6	0.4 ~ 8.2
Mayorga	0	0	0		~
Merida	0	16	0		~
Palo	0	0	0		~
Palompon	0	0	0		~
Pastrana	0	0	0		~
San Isidro	0	0	0		~
San Miguel	3	0	2	70.0	56.0 ~ 84.0
Santa Fe	0	1	0		~
Tabango	10	0	3	1.8	0.6 ~ 3.8
Tabontabon	0	0	0		~
Tacloban City	0	0	0		~
Tanauan	0	0	0		~
Tolosa	2	0	1	0.5	0.5 ~ 0.5
Tunga	0	0	0		~
Villaba	0	0	0		~

Note: Ave. lps & Range lps mean the average discharge and the range of discharges in lps (liter/second), respectively.

### 7.5 Surface Water Sources

The major rivers in the province were selected to evaluate their potential as water supply sources to meet the future water needs of the province. The following criteria were adopted for the selection:

- rivers which have gauging stations, and
- rivers with watershed of 100 km<sup>2</sup> or more.

Based on the above criteria, the selected major rivers are Sangputan, Lingayon, Daguitan, Bito, Layog, Payonjan, Pagsanghan and Palaypay Rivers. Dapdap, Cadacan, Baleon and Calingcaguin Rivers are tributaries of the major rivers as shown in Figure 7.5.1 River Network Map.

The gauging stations in the province are located at Sangputan, Ligayon, Daguitan, Bito and Pagsanghan Rivers, which are shown in Figure 7.5.1. The runoff records are obtained from the "Philippine Water Resources Summary Data" prepared by the NWRC in 1980. The information on the gauging stations and the present uses (water rights) of the major rivers in the province is summarized in Table 7.5.1.

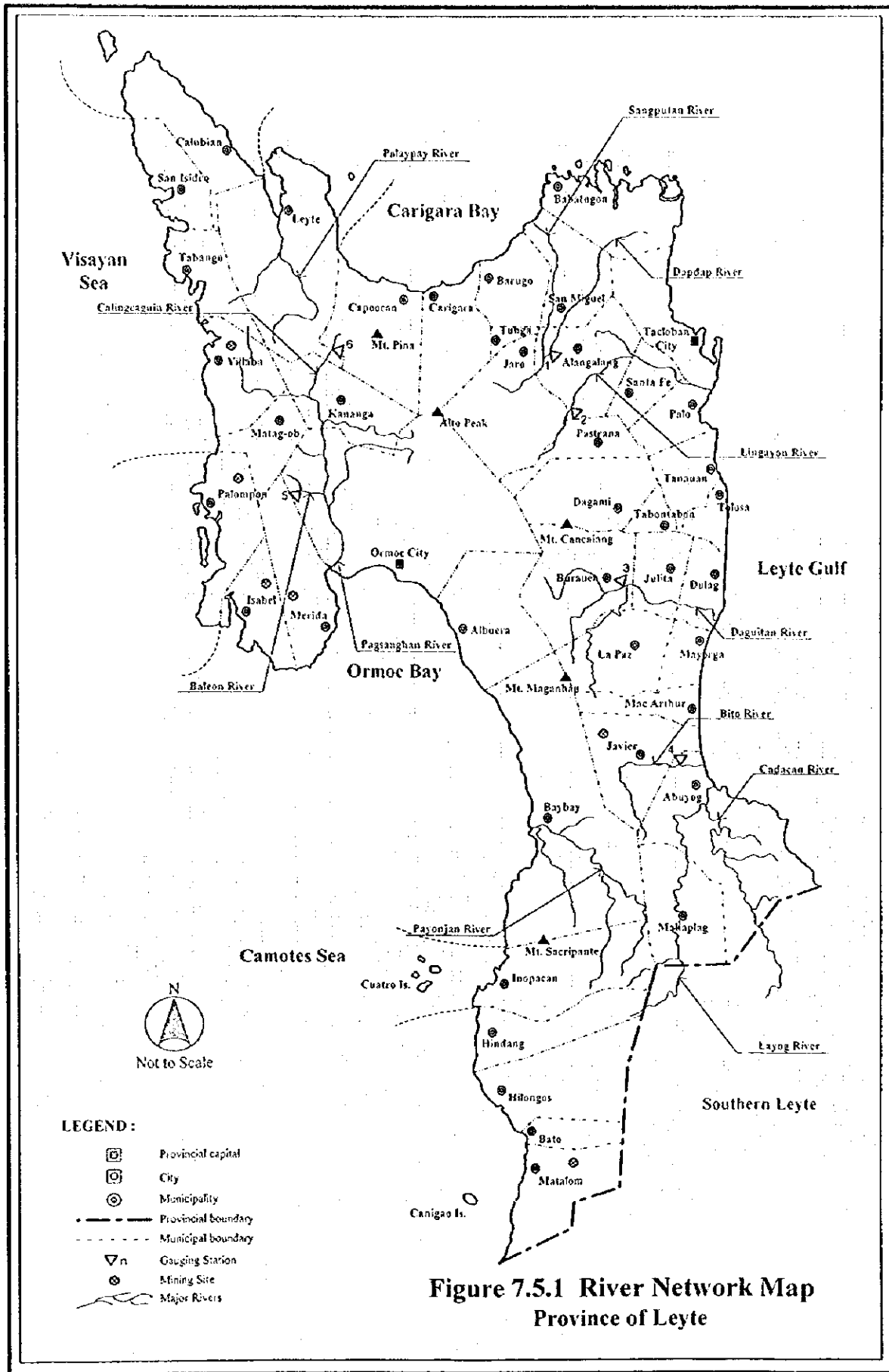
(1) Surface Water Utilization/Water Rights

As seen in Table 7.5.1, the present water uses in the watershed of the major rivers total to 29.5 m<sup>3</sup>/sec. The diversions for major flume, which are operated by NIA, are located in Abuyog (Cadacan and Bito Rivers), Alangalang and Pastrana (Lingayon River), Buraen and La Paz (Daguitan River), and Ormoc City (Pagsanghan River), respectively. Mining sites are located in the mountainous area. Most of them are located in Javier, Merida, Isabel and Palompon as shown in the Figure 7.5.1.

(2) River Flow Analysis

The flow duration curves, derived from the available runoff records, are shown in Figure 7.5.2. The stream flow, maintenance flow, diversion flow and return flow are usually used to estimate the exploitable surface water potential. In this study, the stream flow was considered as the flow potential for domestic use and the diversion flow value was treated as the equivalent to the discharge of water rights registration in surface water use. No detailed study on the return flow has been performed yet due to the difficulties in investigating the irrigation, evapotranspiration and recharge value to groundwater, etc. within the entire watersheds in the province. Therefore, the return flow was not considered for the estimation of exploitable potential.

It is generally accepted that to secure the required volume for water supply, each water use sector adopts the different return periods. Usually, the dependability of domestic water supply is taken to be 90% or higher (10-year or longer return-period) of the whole hydrological period.



**Figure 7.5.1 River Network Map  
Province of Leyte**

Table 7.5.1 Gauging Station & River Water Use by Major River Basins

Major River	River Basin	Information from Gauging Station					Surface Water Use (Water Rights) in Watershed				
		Drainage*1 sq. km	Location No. in Figure 7.5.1	Peak Obs.	Max. Qdr	River Flow Rate (Q: cum/sec) Mini. Qdr	Municipality in watershed	Domestic cum/sec	Industrial cum/sec	Irrigation cum/sec	Others*3 cum/sec
Sanicupan	Dadab						Babamson	-	-	0.00	-
	Main	30.0 (1): No gauging station exists.	Bugayvista	60.08	39.68	0.31	San Miguel	-	-	0.14	-
							Alangalang	NR*4	NR*4	0.07	NR*4
Lingayon	Main						Jaro	NR*4	NR*4	NR*4	NR*4
		10.0 (2): No gauging station exists.	Lingayon	37.02	25.71	0.42	Alangalang	NR*4	NR*4	NR*4	NR*4
							San Miguel	NR*4	NR*4	0.11	NR*4
Daanin	Main						Dagami	NR*4	NR*4	NR*4	NR*4
		135.0 (3): No gauging station exists.	Poblacion	343.85	144.28	5.45	Pastrana	1.00	-	2.24	-
							Jaro	-	-	0.85	-
Bito	Main						Alangalang	NR*4	NR*4	6.03	NR*4
							Sanja Fe	NR*4	NR*4	NR*4	NR*4
							Palo	NR*4	NR*4	NR*4	NR*4
Lavog	Main						La Paz	-	-	1.95	-
							Barauren	-	-	4.50	-
							Iulita	NR*4	NR*4	NR*4	NR*4
Pavonian	Main						Dulge	-	-	0.19	-
							Abuog	-	-	0.00	-
							Inyer	-	-	0.05	-
Pasangan	Main						Abuog	-	-	3.50	NR*4
							(Southern Leyte)*5	NR*4	NR*4	NR*4	NR*4
							Abuog	-	-	6.56	-
Pavonian	Main						Abuog	NR*4	NR*4	NR*4	NR*4
							Indang	NR*4	NR*4	NR*4	NR*4
							Inopacan	NR*4	NR*4	NR*4	NR*4
Pavonian	Main						(Southern Leyte)*5	NR*4	NR*4	NR*4	NR*4
							Mahablag	-	-	0.09	-
							Abuog	-	-	0.70	-
Pavonian	Main						Inopacan	NR*4	NR*4	NR*4	NR*4
							Bavbay	-	-	0.27	-
							Capocan	NR*4	NR*4	NR*4	NR*4
Pavonian	Main						Kangangan	NR*4	NR*4	NR*4	NR*4
							Villaba	-	-	0.07	-
							Matag-ob	-	-	0.49	-
Pavonian	Main						Kanganga	0.00	0.01	0.05	-
							Ormoc City	-	-	0.61	-
							Levir	NR*4	NR*4	NR*4	NR*4

Source: Philippine Water Resources Summary Data, established January 1980 by NWRRC

- Notes:
- Drainage\*1 : Watershed Area at Gauging Station
  - NA\*2 : Recorded River Gauge Height only
  - Others\*3 : Including Livestock, Recreation & Fisheries
  - NR\*4 : Surface water utilization was not registered in NWRB Database, as of March 1997.
  - (Province)\*5 : Out of Applicable Area

- Qp : Peak Discharge of Daily Maximum Discharge
- Qdr : Maximum Daily Discharge of Weighted Daily Discharge
- Qdn : Minimum Daily Discharge of Weighted Daily Discharge

In determining the river maintenance flow, such factors as runoff characteristics, navigation, fishing, picturesque scenery, salt water intrusion, clogging of river mouth, riparian structures, groundwater table, flora and fauna, and river water quality shall be considered to maintain the normal function of the river. In the Philippines, 10% of the dependable flow of the river is required as minimum maintenance flow. Therefore, the maintenance flow was calculated as the dependable flow for irrigation, which equals to 80% (5-year return-period) of the whole hydrological period.

Finally, the exploitable potential of surface water in the province was studied in the case of inflow to and outflow from the respective municipalities. The results are summarized in Table 7.5.2.

### (3) Surface Water Quality

Mining sites (presently non-operational) are located upstream of the Bito and Pagsanghan River. Major mining products were copper, chromite and manganese. The locations of the mining sites are shown in Figure 7.5.1.

The results of water quality analysis are summarized in Table 7.5.1, Data Report. The sampling locations were selected upstream of the respective municipalities. In the said table, Class AA and Class A of the DENR "Water Quality Criteria for Fresh Water" are shown as reference for raw water evaluation. The PNSDW-1994 is also used to evaluate water quality with reference to turbidity and trace elements. The water quality of the selected rivers falls within the class "AA" or "A" standard, although the parameters tested are limited.

Percent of Time (%) (No. in Figure 7.5.1)	Specific Discharge (cum/sec/100sq km)					
	Dapdap 1	Lingayon 2	Daguitan 3	Bito 4	Baleon 5	Calingcaguin 6
10%	16.04	21.88	17.41	30.12	7.47	11.11
20%	9.43	16.98	13.63	22.34	6.58	9.33
30%	7.15	12.68	11.18	19.59	5.63	7.81
40%	4.80	10.64	9.09	17.10	5.37	6.63
50%	4.00	9.19	8.07	13.11	4.95	5.59
60%	3.02	8.40	7.36	9.02	4.63	4.97
70%	2.44	7.70	6.44	6.65	4.32	4.26
80%	2.06	6.70	5.89	5.78	4.11	3.68
90%	1.63	5.54	5.17	4.32	3.68	3.18
100%	0.70	1.20	3.19	2.51	1.53	1.86
Data Period	1952-'68	1948-'70	1957-'68	1957-'68	1956-'70	1948-'70

Source; Philippine Water Resources Summary Data, as of Jan. 1980 by NWRC  
Interim Report, Master Plan Study on Water Resources Management, as of Oct. 1997 by NWRB

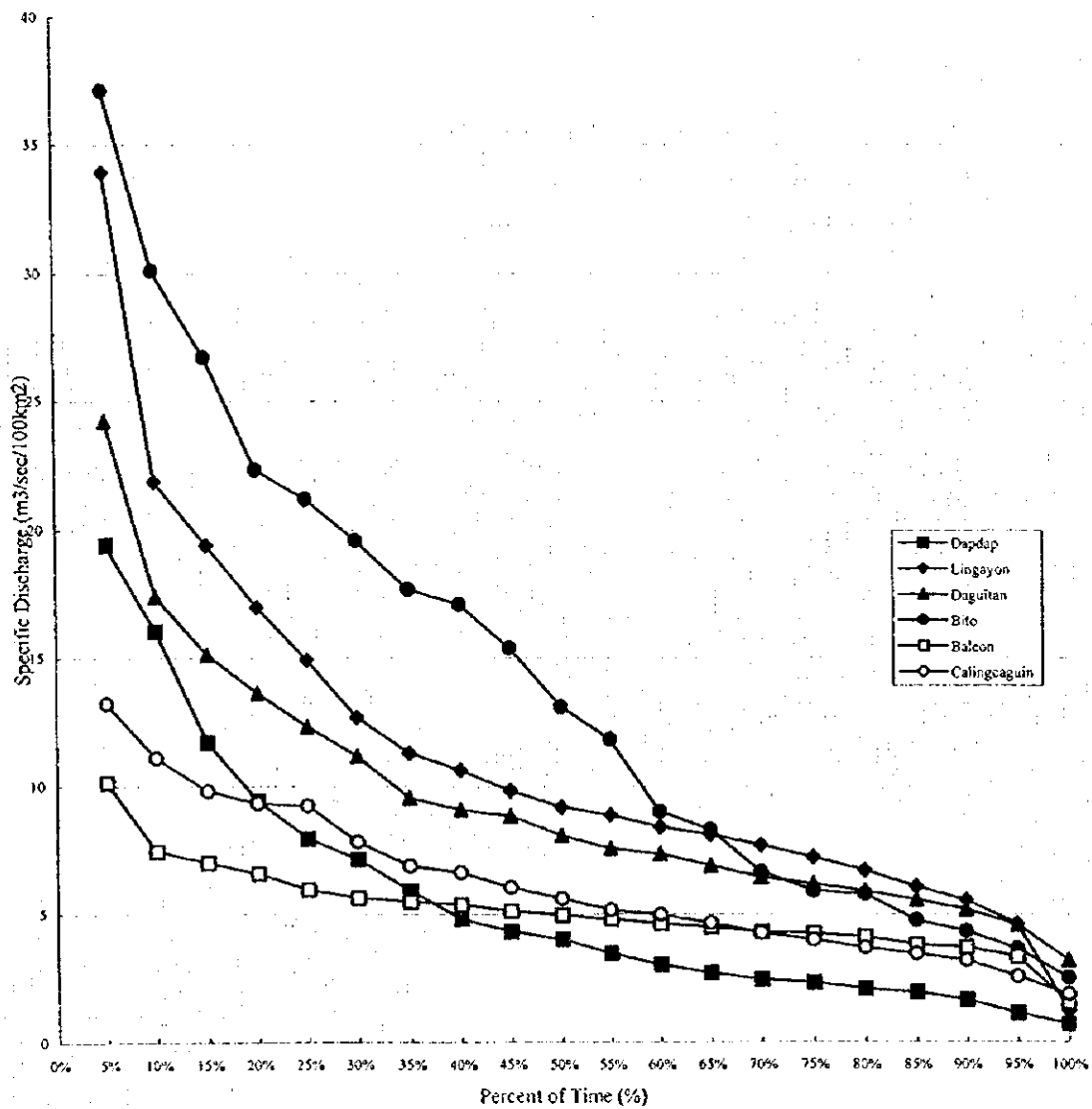


Figure 7.5.2 River Flow Duration Curve



**Table 7.5.2 Probability of Surface Water**

Surface Water Sources		Related Data				Probability of Surface Water (10-year return-period)									
Major River Water System & Main	Location Municipality & other Province	River Connection	Watershed Area in		Sp. D (return-period)		Inlet Flow to Municipality		Outlet Flow from Municipality		Potential (12) (cu m/sec)				
			Location (1) sq. km	Upstream (2) sq. km	10-year (3) Q	5-year (4) Q	S/Flow (5) (cu m/sec)	M/Flow (6) (cu m/sec)	S/Flow (9) (cu m/sec)	M/Flow (10) (cu m/sec)					
Samaputan	Dapdap	to Main	Babatingon	42.77	0.00	1.63	2.06	0.00	0.00	0.70	0.09	0.00	0.00		
			San Miguel	62.91	42.77	1.63	2.06	0.70	0.09	1.73	0.22	0.73	0.22	0.14	
Main		from Dapdap	Alangalang	16.72	105.68	1.63	2.06	1.73	0.22	2.00	0.25	2.00	0.21	1.54	
			Jaro	74.35	0.00	1.63	2.06	0.00	0.00	1.21	0.15	1.21	0.00	1.06	
			Alangalang	11.15	196.75	1.63	2.06	3.21	0.41	3.40	0.43	3.40	0.43	0.21	2.76
			San Miguel	57.19	207.90	1.63	2.06	3.40	0.43	3.40	0.43	4.33	0.55	0.32	3.46
Umaynon			Dagami	36.92	0.00	5.54	6.70	0.00	0.00	2.05	0.25	2.05	0.25	0.00	
			Pastrana	30.50	36.92	5.54	6.70	2.05	0.25	1.80	0.25	3.74	0.45	2.24	1.04
			Jaro	74.35	67.42	5.54	6.70	3.74	0.45	7.85	0.95	7.85	0.95	4.09	2.81
			Alangalang	12.63	141.77	5.54	6.70	14.65	1.77	10.12	1.77	14.65	1.77	10.12	2.76
Daguitan			Santa Fe	34.13	264.40	5.54	6.70	16.54	2.00	17.22	2.08	17.22	2.08	10.12	5.02
			Palo	12.29	298.53	5.54	6.70	16.54	2.00	0.00	0.00	7.76	0.88	1.95	4.93
			La Paz	150.06	0.00	5.17	5.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80
			Barauen	162.29	150.06	5.17	5.89	7.76	0.88	16.15	1.84	16.15	1.84	6.45	7.86
Bito			Julita	23.32	312.35	5.17	5.89	16.15	1.84	17.36	1.98	17.36	1.98	6.45	8.93
			Dulag	17.73	335.67	5.17	5.89	17.36	1.98	0.00	0.00	18.28	2.08	6.64	9.56
			Abuyog	21.43	0.00	4.32	5.78	0.00	0.00	0.00	0.00	0.93	0.12	0.00	0.80
			Javier	94.53	21.43	4.32	5.78	5.01	0.67	5.01	0.67	5.94	0.79	0.05	4.29
Layog	Cadacan Main	to Main	Abuyog	21.43	115.96	4.32	5.78	5.01	0.67	5.94	0.79	5.94	0.79	3.55	1.59
			Abuyog	133.95	139.31	4.32	5.78	6.02	0.80	11.81	1.58	11.81	1.58	6.56	3.67
			Hindang	25.48	0.00	4.32	5.78	0.00	0.00	0.00	0.00	1.10	0.15	0.00	0.95
			Inopacan	20.85	25.48	4.32	5.78	1.10	0.15	2.00	0.27	2.00	0.27	0.00	1.73
Payonjan	Calmeasagum Main	from Cadacan	Southern Leyte	64.30	46.33	4.32	5.78	2.00	0.27	4.78	0.64	4.78	0.64	0.00	4.14
			Mahaplag	152.15	110.63	4.32	5.78	4.78	0.64	11.36	1.52	11.36	1.52	0.09	9.75
			Abuyog	60.89	536.04	4.32	5.78	23.17	3.10	25.80	3.45	25.80	3.45	7.35	15.00
			Inopacan	78.17	0.00	3.18	3.68	0.00	0.00	2.48	0.29	2.48	0.29	0.00	2.20
Pagsamghan	Main	to Main	Bavbay	186.16	78.17	3.18	3.68	2.48	0.29	8.40	0.97	8.40	0.97	7.15	
			Capoccan	76.34	0.00	3.18	3.68	0.00	0.00	2.43	0.28	2.43	0.28	0.00	2.14
			Kangganga	40.38	76.34	3.18	3.68	2.43	0.28	3.71	0.43	3.71	0.43	0.00	3.28
			Villaba	57.27	0.00	3.18	3.68	0.00	0.00	1.82	0.21	1.82	0.21	0.07	1.54
Palaypay			Matag-ob	16.16	57.27	3.18	3.68	1.82	0.21	2.33	0.27	2.33	0.27	0.56	1.50
			Kangganga	103.82	190.15	3.18	3.68	6.04	0.70	9.34	1.08	9.34	1.08	0.63	7.63
			Ormoc City	232.15	293.97	3.18	3.68	9.34	1.08	16.71	1.94	16.71	1.94	1.24	13.54
			Leyte	153.19	0.00	3.18	3.68	0.00	0.00	4.87	0.56	4.87	0.56	0.00	4.30

Notes:  
 Sp. D (Specific Discharge) was analyzed by monthly mean flow records from gauging station.  
 S/Flow (Stream Flow) was estimated specific discharge (10-year return-period) multiplied by upstream area.  
 M/Flow (Maintenance Flow) was estimated 10% of river flow in case of 5-year return-period.  
 Sp. D (10-year or 5-year return-period) without gauging station was adopted by the other analysis result from near gauging station.  
 Inlet & outlet "Use" (Water Rights) are summed up by NWRB Database, as of March 1997.  
 Unit Q for Specific Discharge is cu. m/sec/100 sq. km.  
 S/Flow, M/Flow & Use in final outlet flow of each stream system was added to respective inlet flows of main system.

## 7.6 Future Development Potential of Water Sources

### (1) Groundwater

A well inventory covering all the municipalities shows that there are 14,684 existing wells in the province, while 1,028 wells are recorded in the inventory prepared by PSPT (See Table 7.1.1 and 7.3.1, Data Report). Despite the smaller number of wells included in the PSPT data, these were used in the analysis, since these provided technical information. Of the total 1,028 wells, 946 have complete information: depth, static water level and specific capacity. Data are summarized in Table 7.6.1 Existing Well Sources.

**Table 7.6.1 Existing Well Sources**

Municipality/ City	Type	No.	Depth (m)		SWL (mbgs)		Sp. Cap. (lpsm)	
			Ave.	Range	Ave.	Range	Ave.	Range
Abuyog	DW	-	-	-	-	-	-	-
	SW	62	11.8	10.0 - 16.0	4.0	3.0 - 6.0	0.2	0.2 - 0.2
Alangalang	DW	63	43.0	20.0 - 100.0	12.2	3.0 - 30.0	0.2	0.2 - 0.2
	SW	18	17.2	8.0 - 18.0	3.7	3.0 - 6.0	0.2	0.2 - 0.2
Albuera	DW	5	26.4	24.0 - 32.0	1.7	ff - 2.5	0.2	0.2 - 0.2
	SW	14	6.3	6.0 - 12.0	2.8	ff - 3.0	0.2	0.2 - 0.2
Babatngon	DW	10	21.9	20.0 - 25.0	3.6	3.0 - 6.0	0.3	0.2 - 0.7
	SW	14	11.3	6.0 - 19.0	3.4	3.0 - 6.0	0.3	0.2 - 2.2
Barugo	DW	5	34.7	20.0 - 61.0	8.4	3.0 - 30.0	1.0	0.2 - 4.2
	SW	29	9.0	3.0 - 19.0	3.0	3.0 - 3.0	0.2	0.2 - 0.2
Bato	DW	33	36.2	20.0 - 48.0	3.4	ff - 9.0	0.5	0.2 - 10.0
	SW	23	15.9	12.0 - 18.0	4.2	3.0 - 6.0	0.2	0.2 - 0.2
Baybay	DW	-	-	-	-	-	-	-
	SW	-	-	-	-	-	-	-
Buraen	DW	-	-	-	-	-	-	-
	SW	-	-	-	-	-	-	-
Calubian	DW	-	-	-	-	-	-	-
	SW	61	8.4	5.0 - 15.0	3.4	3.0 - 6.0	0.2	0.2 - 0.2
Capoocan	DW	-	-	-	-	-	-	-
	SW	2	2.8	1.0 - 15.0	2.0	1.0 - 3.0	0.2	0.2 - 0.2
Carigara	DW	3	47.2	40.0 - 80.0	12.0	3.0 - 30.0	0.2	0.1 - 0.2
	SW	-	-	-	-	-	-	-
Dagami	DW	3	23.2	20.0 - 25.0	3.0	3.0 - 3.0	0.2	0.2 - 0.2
	SW	6	14.7	12.0 - 18.0	3.0	3.0 - 3.0	0.2	0.2 - 0.2

Table 7.6.1 Existing Well Sources

(Cont'd)

Municipality/ City	Type	No.	Depth (m)			SWL (mbgs)			Sp. Cap. (lpsm)		
			Ave.	Range		Ave.	Range		Ave.	Range	
Dulag	DW	2	56.3	48.3 - 60.0		ff	ff - ff		0.2	0.2 - 0.2	
	SW	44	5.1	3.0 - 12.0		-	-		0.2	0.2 - 0.2	
Hilongos	DW	24	35.0	20.0 - 40.0		4.9	3.0 - 22.9		0.7	0.2 - 7.5	
	SW	34	12.2	7.0 - 18.0		4.1	2.0 - 6.0		0.2	0.2 - 0.2	
Hindang	DW	14	25.8	24.0 - 30.0		8.1	Ff - 22.0		0.7	0.2 - 1.7	
	SW	12	6.9	6.0 - 18.0		3.0	3.0 - 3.0		0.2	0.2 - 0.2	
Inopacan	DW	-	-	-		-	-		-	-	
	SW	7	5.9	4.6 - 8.0		5.6	3.0 - 6.0		0.2	0.2 - 0.2	
Isabel	DW	10	34.3	30.0 - 40.0		5.5	ff - 9.0		0.2	0.2 - 0.2	
	SW	11	15.0	15.0 - 15.0		4.6	3.0 - 6.0		0.2	0.2 - 0.2	
Jaro	DW	4	32.5	32.5 - 32.5		16.5	16.5 - 16.5		10.5	10.5 - 10.5	
	SW	31	8.4	6.0 - 15.0		3.5	3.0 - 6.0		1.0	0.2 - 3.5	
Javier	DW	17	34.3	24.0 - 45.0		4.5	3.0 - 11.0		0.4	0.2 - 1.9	
	SW	9	15.5	12.0 - 18.0		3.3	3.0 - 6.0		0.2	0.2 - 0.2	
Julita	DW	6	77.6	38.0 - 90.0		17.2	3.0 - 20.0		0.2	0.2 - 0.2	
	SW	20	17.0	14.0 - 18.0		3.0	3.0 - 3.0		0.2	0.2 - 0.2	
Kananga	DW	4	24.0	24.0 - 24.0		12.8	3.0 - 16.0		1.8	0.2 - 2.6	
	SW	15	10.3	9.0 - 16.0		3.0	3.0 - 3.0		0.2	0.2 - 0.2	
La Paz	DW	1	20.0	20.0 - 20.0		5.0	5.0 - 5.0		0.7	8.7 - 8.7	
	SW	44	8.9	6.0 - 12.0		3.7	3.0 - 6.0		0.5	0.2 - 2.1	
Leyte	DW	6	33.4	24.0 - 36.0		3.0	3.0 - 3.0		0.2	0.2 - 0.2	
	SW	5	14.8	12.0 - 18.0		4.2	3.0 - 6.0		0.2	0.2 - 0.2	
MacArthur	DW	10	51.1	42.7 - 56.4		23.7	3.0 - 40.0		0.6	0.2 - 1.4	
	SW	20	8.0	6.0 - 9.0		3.3	3.0 - 6.0		0.2	0.2 - 0.2	
Mahaplag	DW	1	24.0	24.0 - 24.0		6.0	6.0 - 6.0		0.5	0.5 - 0.5	
	SW	10	12.8	6.0 - 18.0		3.6	3.0 - 6.0		0.2	0.2 - 0.2	
Matagob	DW	-	-	-		-	-		-	-	
	SW	13	7.1	1.5 - 12.0		2.8	0.5 - 3.0		0.2	0.2 - 0.2	
Matalom	DW	17	22.8	20.0 - 26.0		3.0	3.0 - 3.0		0.2	0.2 - 0.2	
	SW	28	11.2	2.0 - 18.0		3.8	3.0 - 6.0		0.2	0.2 - 0.2	
Mayorga	DW	17	23.4	20.0 - 40.0		4.2	3.0 - 10.0		0.2	0.2 - 0.2	
	SW	1	18.0	18.0 - 18.0		3.0	3.0 - 3.0		0.2	0.2 - 0.2	
Merida	DW	18	34.2	27.0 - 53.0		4.2	3.0 - 25.0		1.6	0.2 - 26.0	
	SW	18	12.7	6.0 - 18.0		3.0	3.0 - 3.0		0.2	0.2 - 0.2	

Table 7.6.1 Existing Well Sources

(Cont'd)

Municipality/ City	Type	No.	Depth (m)		SWL (mbgs)		Sp. Cap. (lpsm)	
			Ave.	Range	Ave.	Range	Ave.	Range
Palo	DW	-		-		-		-
	SW	-		-		-		-
Palompon	DW	9	28.1	24.5 - 28.4	22.0	3.0 - 24.4	1.7	0.2 - 1.9
	SW	25	10.0	6.1 - 18.3	4.8	3.0 - 12.1	0.9	0.2 - 3.0
Pastrana	DW	1	20.0	20.0 - 20.0	3.0	3.0 - 3.0	0.2	0.2 - 1.2
	SW	12	4.4	3.0 - 6.0	3.5	3.0 - 6.0	0.2	0.2 - 0.2
San Isidro	DW	9	35.7	30.0 - 100.0	11.9	6.0 - 65.0	0.3	0.2 - 0.9
	SW	18	3.7	3.4 - 4.5	3.0	3.0 - 3.0	0.2	0.2 - 0.2
San Miguel	DW	4	24.4	24.4 - 24.4	3.0	3.0 - 3.0	0.2	0.2 - 0.2
	SW	17	6.4	3.0 - 18.3	3.0	3.0 - 3.0	0.2	0.1 - 0.2
Santa Fe	DW	-		-		-		-
	SW	21	3.2	1.5 - 5.0	2.6	1.0 - 5.0	0.2	0.1 - 0.2
Tabango	DW	-		-		-		-
	SW	13	6.0	6.0 - 6.0	3.0	3.0 - 3.0	0.2	0.2 - 0.2
Tabontabon	DW	1	35.0	35.0 - 35.0	-	-	1.7	1.7 - 1.7
	SW	8	14.8	14.0 - 15.0	3.0	3.0 - 3.0	0.2	0.2 - 0.2
Tacloban City	DW	-		-		-		-
	SW	-		-		-		-
Tanauan	DW	8	20.0	20.0 - 20.0	3.0	3.0 - 3.0	0.2	0.2 - 0.2
	SW	12	16.4	12.0 - 18.0	3.0	3.0 - 3.0	0.2	0.2 - 0.2
Tolosa	DW	-		-		-		-
	SW	17	4.5	4.5 - 4.5	4.1	2.0 - 4.5	0.2	0.2 - 0.2
Tunga	DW	1	20.0	20.0 - 20.0	6.0	6.0 - 6.0	0.2	0.2 - 0.2
	SW	7	14.8	10.0 - 18.0	3.9	3.0 - 6.0	0.2	0.2 - 0.2
Villaba	DW	-		-		-		-
	SW	25	6.3	5.0 - 12.0	4.0	3.0 - 6.0	0.2	0.2 - 0.2

Notes: The values of "Ave. depth, SWL and Sp.Cap." by municipality are estimated using the weighted average based on 1995 census population in respective barangays at well location.

SWL=static water level, Sp.Cap.=specific capacity, Ave.=average, SW=shallow well, DW=deep well and ff=free flowing well

Considering the well information, the most productive wells are those with the depth ranging from 12m to 18m and from 25m to 100m. The good yielding wells have static water level varying from about 3m to 9mbgs and specific capacity of about 5 lpsm to 10 lpsm.

Based on the hydraulic characteristics and location of wells in Leyte, aquifers are widely distributed along Leyte and Ormoc Valleys that originate from the Leyte Central Mountain

Range and flow to Carigara Bay, Leyte Gulf and Ormoc Bay. Shallow well areas are distributed only along the western coastal areas facing the Visayan Sea. The Miocene and older rock units are widely distributed in the central part and the island-edge parts of the province that are classified as difficult area for groundwater development.

As indicated in Figure 7.3.1 Main Report, Ormoc Valley is a high yielding potential area covering the southwestern part of the province. There are numerous free flowing deep wells in this area. However, the discharge amount from free flowing deep well has been decreasing annually in the municipalities of Albuera, Kananga and Merida, and Ormoc City. Probably, the balance between groundwater use and the amount of recharge was collapsed.

Leyte Valley is also a development potential area covering the eastern half-part of the province. Ironic water from Level-I well facilities may be found in this area. According to the water quality examination results, groundwater in this area shows low pH value (acid groundwater) ranging from 5.9 to 6.8.

As alternative water sources, the untapped springs can be developed for future use. These are the most reliable sources for water supply in the province because groundwater quality has a serious problem of ironic water. Existing spring sources of 900 are utilized for water supply and most of them originate from the Leyte Central Mountain Range and the mountain systems in the eastern and western parts of the province. The untapped springs of 162 are proposed as future water sources in the same areas of developed spring locations.

The detailed hydrogeological characteristics of each municipality are summarized in Table 7.6.2, while individual well locations with technical information are shown in Figure 7.6.1 individual Well Location and Specification Map, Data Report.

Table 7.6.2 Hydrogeological Descriptions by Municipality

Municipality	Ground Information				Well Information				Groundwater Information												
	Topography		Geology		Depth		SWL		Availability		Potential		Quality								
	Area Proportion (%)		Stratigraphy of Geological Age*		m		mbsgs		Area Proportion (%)		Comparative		Area Feature								
	Plain-Plateau	Hilly-Piedmont	Mountain	Lithofacies (Major Aquifers)	Q	Neogene	Tertiary	C	mini.	max.	mini.	max.	ave.	Sp.Cap. (gpm)	SW	DW	Diff.	Wells	Springs	Problem	Pollutants
Abuyog	36%	16%	48%	recent deposits & limestone	X	X	X	10	16	2.0	6.0	6.0	0.2	2	0%	52%	48%	fair	few	saline	
Alangalang	89%	3%	8%	recent deposits	X	X	X	3	100	3.0	30.0	30.0	0.2	0	0%	92%	8%	good	poor	ironic	
Albuera	3%	9%	88%	limestone	X	X	X	6	32	ff	3.0	3.0	0.2	0	0%	43%	57%	fair	rich	ironic	
Babatngon	2%	32%	66%	limestone	X	X	X	6	25	3.0	6.0	6.0	0.3	0	0%	34%	66%	rich	few	saline	
Barugo	100%	0%	0%	recent deposits & limestone	X	X	X	3	61	3.0	30.0	30.0	0.6	0	0%	100%	0%	good	poor	saline	
Bato	3%	97%	0%	limestone	X	X	X	12	48	ff	9.0	9.0	0.4	1	0%	100%	0%	fair	few	saline	
Baybay	8%	21%	71%	recent deposits & limestone	X	X	X	-	-	-	-	-	-	0	0%	89%	11%	good	few		
Burauen	41%	37%	22%	recent deposits & limestone	X	X	X	-	-	-	-	-	-	0	0%	77%	23%	fair	few		
Calubian	4%	88%	8%	limestone	X	X	X	5	15	3.0	6.0	6.0	0.2	0	0%	92%	8%	fair	few		
Capocan	5%	16%	79%	recent deposits & limestone	X	X	X	1	15	1.0	3.0	3.0	0.2	0	0%	21%	79%	good	few	ironic & acid	
Carigara	80%	11%	9%	recent deposits & limestone	X	X	X	40	80	3.0	30.0	30.0	0.2	0	0%	91%	9%	good	poor	ironic & acid	
Dagami	64%	25%	11%	recent deposits & limestone	X	X	X	12	25	3.0	3.0	3.0	0.2	0	0%	89%	11%	good	few		
Dulag	100%	0%	0%	recent deposits	X	X	X	3	60	ff	ff	ff	0.2	1	0%	100%	0%	good	poor	saline	
Hilongos	19%	59%	22%	limestone & conglomerate	X	X	X	7	40	3.0	22.9	22.9	0.5	3	0%	97%	3%	good	few	saline	
Hindang	6%	72%	22%	limestone & conglomerate	X	X	X	6	30	ff	22.0	22.0	0.5	0	0%	78%	22%	good	few	saline	
Inopacan	0%	68%	32%	limestone & conglomerate	X	X	X	5	8	3.0	6.0	6.0	0.2	0	0%	68%	32%	fair	few	mining	
Isabel	11%	62%	27%	recent deposits & limestone	X	X	X	15	40	ff	9.0	9.0	0.2	1	0%	73%	27%	fair	few	saline	
Jaro	21%	64%	15%	recent deposits & limestone	X	X	X	6	33	3.0	16.5	16.5	2.1	1	0%	85%	15%	fair	few	ironic	
Javier	30%	26%	44%	recent deposits & limestone	X	X	X	12	45	3.0	11.0	11.0	0.3	0	0%	56%	44%	fair	few	saline	mining
Julita	94%	6%	0%	recent deposits	X	X	X	14	90	3.0	20.0	20.0	0.2	0	0%	100%	0%	good	few		
Kananga	38%	49%	13%	recent deposits & limestone	X	X	X	9	24	3.0	16.0	16.0	0.6	0	0%	89%	11%	good	poor	ironic	
Lapaz	15%	46%	39%	recent deposits & limestone	X	X	X	6	20	3.0	6.0	6.0	0.7	0	0%	81%	19%	fair	few		

Legend: Geological Age, Q=Quaternary, Neo=Neogene, Paleo=Paleogene, C=Cretaceous  
 Well Information, SWL=static water level, Sp.Cap=specific capacity, L-III=well operated for L-III service  
 Groundwater Information, SW=solo shallow well area, DW=deep well area, Diff=difficult area, ff=free flowing

Table 7.6.2 Hydrogeological Descriptions by Municipality

Municipality	Ground Information										Well Information					Groundwater Information				
	Topography		Geology			Depth m	SWL		Sp.Cap.		L-III	Availability		Potential		Quality				
	Area Proportion (%)		Stratigraphy of Geological Age*				min.	max.	min.	max.		Area Proportion (%)	Comparative	Area Feature	Problem	Area Feature				
	Plain-Plateau	Hilly-Piedmont	Lithofacies (Major Aquifers)	Q	Neoc.	Paleo.	C	min.	max.	min.	max.	SW	DW	Diff.	Wells	Springs	Problem	Area Feature		
Leyte	6%	94%	0% limestone	X	X	X	12	36	3.0	6.0	0.2	0	0%	93%	7% fair	few				
Mac Arthur	51%	16%	33% recent deposits & limestone	X	X	X	6	56	3.0	40.0	0.3	0	0%	87%	13% fair	poor	saline			
Maunabo	2%	74%	24% limestone	X	X	X	6	24	3.0	6.0	0.3	0	0%	91%	9% fair	rich				
Matangob	13%	75%	12% recent deposits & limestone	X	X	X	2	12	0.5	6.0	0.2	0	0%	28%	72% poor	few	mining			
Matalom	4%	64%	32% limestone	X	X	X	2	26	3.0	3.0	0.2	0	0%	98%	2% fair	few				
Mayorga	94%	6%	0% recent deposits	X			18	40	3.0	10.0	0.2	0	0%	97%	3% good	poor	saline			
Merida	3%	54%	43% limestone	X	X	X	6	53	3.0	25.0	0.9	0	0%	48%	52% good	few	mining			
Ormoc City	82%	7%	11% recent deposits & limestone	X	X	X	-	-	-	-	-	14	0%	69%	31% good	poor	fertilizer			
Palo	79%	21%	0% recent deposits	X			-	-	-	-	-	1	0%	69%	31% fair	poor	saline			
Palompon	3%	91%	6% recent deposits & limestone	X	X	X	6	28	3.0	24.4	1.1	0	0%	83%	17% fair	few	saline	mining		
Pastrana	84%	7%	9% recent deposits & limestone	X	X	X	3	20	3.0	6.0	0.2	0	0%	100%	0% good	few				
San Isidro	4%	96%	0% recent deposits	X	X	X	3	100	3.0	65.0	0.2	0	0%	72%	28% fair	few				
San Miguel	53%	4%	43% recent deposits	X	X	X	3	24	3.0	3.0	0.2	0	0%	47%	53% good	few				
Santa Fe	73%	3%	24% recent deposits	X	X	X	2	5	1.0	5.0	0.2	0	0%	73%	27% good	few				
Tabango	3%	61%	36% recent deposits	X	X	X	6	6	3.0	3.0	0.2	0	3%	8%	89% poor	few				
Tabontabon	100%	0%	0% recent deposits	X			14	35	3.0	3.0	0.3	0	0%	100%	0% good	few				
Tacloban City	24%	4%	72% recent deposits & limestone	X	X	X	-	-	-	-	-	0	0%	36%	64% poor	few	saline			
Tanauan	93%	7%	0% recent deposits	X			12	20	3.0	3.0	0.2	0	0%	94%	6% good	poor	saline			
Tolosa	74%	26%	0% recent deposits	X			5	5	2.0	4.5	0.2	0	0%	73%	27% good	poor	saline			
Tunga	100%	0%	0% limestone	X	X	X	10	20	3.0	6.0	0.2	0	0%	100%	0% good	few				
Villaba	3%	9%	88% limestone	X	X	X	5	12	3.0	6.0	0.2	0	12%	0%	88% poor	few	mining			

Legend: Geological Age, Q=Quaternary, Neo.=Neogene, Paleo.=Paleogene, C=Cretaceous  
 Well Information, SWL=static water level, Sp.Cap.=specific capacity, L-III=wells operated for L-III service  
 Groundwater Information, SW=solo shallow well area, DW=deep well area, Diff.=difficult area, ff= free flowing

Additional wells shall be designed employing "gravel packed well" with a gravel thickness of about 50mm or more depending on the grain sizes of aquifers and pumping capacity. While, natural gravel packed well may be adopted within the areas where well-sorted natural gravel formation is distributed at the expected aquifer. Such areas are usually the upstream areas of alluvial fans or plains in the province. The application of such method for Level-I well is also justifiable, since inflow velocity of groundwater through the screen is very low because of minimal pumping rate by means of hand-pump operation.

Generally, shallower well has a higher possibility to be constructed applying the natural gravel packed method than the deeper one in areas formed by recent deposits. This is because the layers at different depths of alluvial plain or fan deposits had been formed by different situations of transportation and sedimentation between varied grain sizes. The adaptability of the natural gravel packed well is experimentally assumed referring to the limited information such as topography, geology, static water levels, etc., as shown in Table 7.6.3.

**Table 7.6.3 Proportion of Gravel Packed and Natural Gravel Packed Wells**

Municipality (only potential area)	Proposed Well Depth	Proportion (%) of Level-I Deep Wells	
		Gravel Packed	Natural Gravel Packed
Baybay	40 m	20 %	80 %
Hilongos	40 m	20 %	80 %
Hindang	40 m	20 %	80 %
Kananga	80 m	30 %	70 %

Examination on the effective grain sizes and uniformity coefficient by sieve analysis at the influential aquifers (composed of coarse sand and/or fine gravel) should be conducted during the implementation period. Such analysis and actual well construction results are very helpful in application of the natural gravel packed method in future planning.

In Leyte Valley, it is reported by DPWH/DEO that numerous deep wells present high Fe contents (PNSDW; Fe<1.0ppm). The results of groundwater quality examination, conducted by the PSPT, show their characteristics with slightly higher Fe and acid pH. Ionic water pumped from deep wells is caused by groundwater itself, well materials eluded in acid water, or combination of groundwater and well materials. There are four cases on water quality problem in terms of Fe and pH value as shown below.



- (1) Iron concentration is less than the PNSDW (1 ppm) and the pH value of groundwater indicates neutral or alkaline. There is a low possibility of iron contamination through the future.
- (2) Although iron concentration is within the PNSDW, groundwater shows an acid pH value. There is a possibility of iron contamination from steel materials.
- (3) Iron concentration exceeds the PNSDW and the groundwater shows neutral or alkaline. There is iron contamination caused by groundwater itself.
- (4) Iron concentration exceeds the PNSDW and groundwater shows acid pH side. There is a possibility of iron contamination caused by groundwater and/or well materials.

Where groundwater has high Fe contents, the Iron Removal Facility shall be additionally installed. Where the parameter of groundwater indicates acid pH side, the well casing pipe and screen shall be designed to use anti-corrosive materials, such as anti-metallic (polyvinyl chloride; PVC) or anti-corrosive metal (stainless steel; SUS) materials.

Generally, shallower well presents water quality with alkalinity parameter. This is because the shallow wells are usually constructed in alluvial plain or fan deposits. The well materials of the said anticorrosive shall be used for deep wells. The development of deep wells using anti-corrosive materials in the province is experimentally assumed referring to the limited information such as results of water quality examination, geology, etc., as shown in Table 7.6.4.

Water quality examination on Fe and pH parameters should be conducted during the implementation period. Such groundwater quality analysis is very helpful to design well materials in future planning.

**Table 7.6.4 Proportion of Wells to be Constructed by Different Materials**

Municipality (only potential area)	Proposed Well Depth	Proportion (%) of Level-I Deep Wells	
		GI Casing Pipes	PVC Casing Pipes
Capoocan	80 m	70 %	30 %
Carigara	40 m	70 %	30 %
Kananga	80 m	90 %	10 %
Palo	40 m	80 %	20 %
Santa Fe	40 m	80 %	20 %
Tanaunan	40 m	80 %	20 %
Tolosa	40 m	80 %	20 %
Tunga	40 m	70 %	30 %

(2) Spring

Untapped spring sources identified are shown in Table 7.6.5. These data were collected and tabulated using the questionnaire sheet-untapped spring information format, Data Report. Data also include the parameters of barangay name, owner, discharge, transmission pipeline length and relative elevation.

**Table 7.6.5 Untapped Spring Sources Identified**

Location		Untapped Spring			
Municipality/City	Barangay	Owner	Discharge (lps)	T.L.L.* (km)	Elevation Difference (m)
Bato	Buli	UK	10.0	NA	NA
	Osmena	UK	20.0	NA	NA
	(Ahag, Hilongos)	UK	30.0	NA	NA
	Domagdoc	UK	50.0	NA	NA
	(Kalalat, Matalom)	UK	60.0	NA	NA
Baybay	Monte Verde	UK	0.2	2.0	NA
	San Juan	UK	0.2	2.0	NA
	Kabatuan	UK	0.3	3.0	NA
	Hilapnitan	UK	0.4	1.0	NA
	Altavista	UK	0.5	2.0	NA
	Kabalasan	UK	0.5	1.2	NA
	Maitum	UK	0.5	2.5	NA
	Matamis	UK	0.5	4.0	NA
	Sapa	UK	0.5	2.5	NA
	Higuloan	UK	0.6	1.0	NA

Table 7.6.5 Untapped Spring Sources Identified

(Cont'd)

Location		Owner	Untapped Spring		
Municipality/City	Barangay		Discharge (lps)	T.L.L.* (km)	Elevation Difference (m)
	Amguhan	UK	0.8	2.5	NA
	Villa Magasao	UK	0.8	2.5	NA
	Biasong	UK	1.0	4.0	NA
	Bidlinan	UK	1.0	3.5	NA
	Butigan	UK	1.0	1.5	NA
	Jaena	UK	1.0	1.0	NA
	Maganhan	UK	1.0	3.0	NA
	Maypatag	UK	1.0	5.0	NA
	Monterico	UK	1.0	3.0	NA
	Sabang	UK	1.0	4.0	NA
	Villa Solidaridad	UK	1.0	3.0	NA
	Kabungaan	UK	1.5	2.5	NA
	Lintaoon	UK	1.5	5.0	NA
	Pomponan	UK	1.5	3.5	NA
	Zacarito	UK	1.5	4.0	NA
	Bitanhuan	UK	2.0	7.0	NA
	Bubon	UK	2.0	7.0	NA
	Buenavista	UK	2.0	6.5	NA
	Imelda	UK	2.0	9.0	NA
	Kagumay	UK	2.0	3.0	NA
	Kansungka	UK	2.0	1.5	NA
	Mahayahay	UK	2.0	3.0	NA
	Marcos	UK	2.0	3.0	NA
	Kambonggaan	UK	2.3	3.5	NA
	Ciabo	UK	2.5	1.0	NA
	Kilim	UK	2.5	2.7	NA
	Igang	UK	3.5	2.5	NA
	Caridad	UK	4.5	3.5	NA
	Kantagnos	UK	4.5	2.5	NA
	Pleridad	UK	5.0	5.0	NA
Burauen	San Fernando	UK	1.5	1.2	NA
	Takin	UK	1.5	0.4	NA
	Villa Patria	UK	1.5	0.3	NA
	Caanislagan	UK	2.0	1.0	NA
	Cadahunan	UK	2.0	1.0	NA
	Catagbacan	UK	2.0	0.9	NA
	Villa Aurora	UK	2.0	0.4	NA

Table 7.6.5 Untapped Spring Sources Identified

(Cont'd)

Location		Untapped Spring			
Municipality/City	Barangay	Owner	Discharge (lps)	T.L.L.* (km)	Elevation Difference (m)
	Villa Rosas	UK	2.0	3.0	NA
	Abuyogon	UK	3.0	0.8	NA
	Kagbana	UK	3.0	1.0	NA
	Rozas	UK	3.0	1.5	NA
	Toloyao	UK	3.0	1.3	NA
	Tagadtaran	UK	4.0	2.0	NA
	Logsongan	UK	10.0	1.5	NA
Capoocan	Culasian	UK	0.5	0.5	NA
	Lemon	UK	0.5	0.8	NA
	Cabulan	UK	0.7	3.0	NA
	Manloy	UK	8.0	0.8	NA
Dagami	Buenavista	UK	0.5	0.5	NA
	Candagara	UK	0.5	0.8	NA
	Katipunan	UK	0.5	0.4	NA
	Lobelobe East	UK	0.5	0.3	NA
	Maragondong	UK	0.5	0.6	NA
	Salvacion	UK	0.5	0.4	NA
	Sawahon	UK	0.6	0.5	NA
	Plaridel	UK	0.7	0.8	NA
	Cabungaan	UK	1.0	0.8	NA
	Camonoan	UK	1.0	0.7	NA
	Capulhan	UK	1.2	1.0	NA
Hilongos	Hitudpan	UK	2.0	2.0	NA
Hindang	Baldoza	UK	30.0	1.0	NA
	Canhaayon	UK	30.0	1.2	NA
	Capudlosan	UK	35.0	1.0	NA
	Doos del Sor	UK	40.0	0.3	NA
	Maasin	UK	50.0	1.2	NA
	Mahilum	UK	50.0	1.5	NA
	Himacugo	UK	60.0	1.5	NA
Inopacan	Guinsangaan	UK	15.0	2.0	NA
	Linao	UK	15.0	3.0	NA
	Taotaon	UK	15.0	4.0	NA
	De los Santos	UK	20.0	2.0	NA
	Macagoco	UK	20.0	5.0	NA
	Tinago	UK	20.0	5.0	NA
Isabel	Bunog	UK	1.5	0.8	NA

Table 7.6.5 Untapped Spring Sources Identified

(Cont'd)

Location		Untapped Spring			
Municipality/City	Barangay	Owner	Discharge (lps)	T.L.L.* (km)	Elevation Difference (m)
	Anislag	UK	2.0	1.3	NA
	Cangag	UK	2.0	0.5	NA
	Mahayag	UK	2.1	1.1	NA
	Consolacion	UK	2.3	1.2	NA
	Libertad	UK	2.4	1.0	NA
	Marvel	UK	3.0	0.8	NA
	Apale	UK	3.5	1.6	NA
	Monte Alegre	UK	3.5	1.2	NA
	Tolingon	UK	3.5	1.5	NA
	Tubed	UK	4.1	2.1	NA
	Santo Nino	UK	4.3	1.5	NA
	Matlang	UK	5.0	2.8	NA
Jaro	Macanip	UK	3.0	1.5	NA
Javier	Magsaysay	UK	2.0	2.0	50
	Caraye	UK	4.0	1.8	150
	Malitbogay	UK	4.0	4.0	30
	San Sotero	UK	4.0	2.0	200
	Talisayan	UK	4.0	1.0	NA
	Ulhay	UK	6.0	8.0	100
	Binulho	UK	10.0	5.0	100
	Odiong	UK	10.0	2.0	10
	Guindapunan	UK	20.0	1.5	100
	Guindapunan	UK	30.0	3.0	150
Kananga	Poblacion	UK	0.5	1.0	NA
La Paz	Bagacay East	UK	0.5	0.5	NA
	Bagacay West	UK	0.5	1.5	NA
	Bocawon	UK	0.5	1.0	NA
	Bongtod	UK	0.5	1.0	NA
	Buracan	UK	0.5	0.5	NA
	Cacao	UK	0.5	0.5	NA
	Cagngaran	UK	0.5	0.5	NA
	Caltayan	UK	0.5	0.3	NA
	Canbarez	UK	0.5	0.5	NA
	Doyog	UK	0.5	0.2	NA
	Gimaranat East	UK	0.5	0.2	NA
	Pawa	UK	0.5	0.5	NA
	Piliway	UK	0.5	1.0	NA

Table 7.6.5 Untapped Spring Sources Identified

(Cont'd)

Municipality/City	Location Barangay	Owner	Untapped Spring		
			Discharge (lps)	T.L.L.* (km)	Elevation Difference (m)
	Rizal	UK	0.5	1.0	NA
	San Victoria	UK	0.5	1.0	NA
	Santa Ana	UK	0.5	1.5	NA
	Santa Elena	UK	0.5	0.2	NA
	Tabang	UK	0.5	1.0	NA
	Tarugan	UK	0.5	1.5	NA
	Leyte	Calaguise	UK	0.2	1.0
Mac Arthur	Lanawan	UK	0.5	0.5	NA
	San Antonio	UK	0.5	0.5	NA
Mahaplag	San Juan	UK	0.5	NA	NA
	Santa Cruz	UK	1.0	1.0	NA
Matagob	Bulak	UK	5.0	NA	NA
	Santo Rosario	UK	9.5	NA	NA
	San Vicente	UK	12.6	0.7	NA
	San Marcelino	UK	28.4	0.5	NA
Matalom	San Salvador	UK	0.4	0.1	NA
	San Vicente	UK	0.4	1.0	NA
	Waterloo	UK	0.4	0.4	NA
	Zaragoza	UK	0.4	0.8	NA
	Santa Fe	UK	0.8	0.2	NA
	Altavista	UK	1.0	1.0	NA
	Bagong Lipunan	UK	1.6	0.6	NA
	Lowan	UK	2.3	1.0	NA
	Itum	UK	2.9	1.0	NA
	Monte Alegre	UK	3.1	1.9	NA
	Tamplanza	UK	4.0	1.2	NA
	Caningag	UK	4.5	0.8	NA
	Tigbao	UK	4.5	1.5	NA
	President Garcia	UK	4.6	0.8	NA
	Hitoog	UK	8.2	0.5	NA
San Miguel	Bahay	UK	56.0	4.0	NA
	Caraycaray	UK	84.0	3.0	NA
Tabango	Catmon	UK	0.6	2.0	NA
	Poblacion	UK	0.9	2.0	NA
	Manlawaan	UK	3.8	15.0	NA
Tolosa	Cantariwis	UK	0.5	3.0	NA

Notes: T.L.L. - Transmission line length  
UK - Unknown Data

NA - Data not available

## **7.7 Water Source Development for Medium-Term Development Plan**

### **7.7.1 Detailed Groundwater Investigation Required**

#### **(1) Groundwater Investigation Required in Leyte Valley**

Groundwater in the chain area between San Miguel and Julita is potable. Other areas in Leyte Valley encounter groundwater problems both in quality and quantity. Especially for quality, the groundwater database is necessary to be prepared and studied. Additionally, the construction of at least five (5) test wells (depending on the analysis results from database and prospecting) with different depths shall be done to examine groundwater quality and yield capacity in the chain area for future groundwater development. The groundwater investigation shall entail the followings:

##### **1) Groundwater Database**

###### **a) Study Area**

Thirteen (13) municipalities to cover San Miguel, Tunga, Alangalang, Jaro, Santa Fe, Pastrana, Palo, Tanauan, Tolosa, Tabontabon, Dagami, Dulag and Julita.

###### **b) Database Parameters**

Well depth, well diameter, static water level with seasonal variation, pumping water level or draw-down, production with operation time, water quality, completion year, present utilization (service level), type of pump facility, ownership, etc.

##### **2) Electric Prospecting**

###### **a) Study Area**

The same 13 municipalities shown in item 1)

###### **b) Scope of Survey**

Method; Schlumberger or Wenner

Sounding Depth; 200m

Sounding Points; 50 points

###### **c) Study**

Hydrogeologic Section with information of quality and permeability

##### **3) Test Deep Wells**

###### **a) Construction Field**

Site(s) shall be pointed out after the study on groundwater database and geologic survey.

b) Specification of Test Deep Well

Number; at least 5 Test Wells

Well Design; well depth of 50m to 150m (expected target aquifers) with well diameter of 250mm and well screen (SUS) length of 15m to 50m

c) Installed Tests

Geophysical Logging; Resistivity (short & long)

Pumping Test; Time draw-down with maximum discharge of 2,500m<sup>3</sup>/day and recovery test

Water Quality Examination; to include Fe, Mn, pH, SO<sub>4</sub>, etc.

(2) Study on Hydraulic Cycle Balance in Ormoc Valley

There are many free-flowing deep wells within Ormoc City area. Presently, their free-flowing discharges are drastically decreased or stopped. Probably, the hydraulic cycle of groundwater has already become imbalance. Without timely groundwater management by the province, saline water intrusion will occur in the near future. For this purpose, test deep wells to serve as an observation wells shall be constructed and studied hydrogeologically. At the same time, groundwater quality examination for the study on fertilizer and wastewater contamination shall be included.

1) Test Deep Wells

a) Construction Field

Site(s) shall be pointed out after the study on groundwater database and geologic survey.

b) Specification of Test Deep Well

Number; at least 5 Test Wells

Well Design; well depth of 50m to 150m (expected target aquifers) with well diameter of 250mm and well screen (SUS) length of 15m to 50m

c) Installed Tests

Geophysical Logging; Resistivity (short & long)

Pumping Test; Time draw-down with maximum discharge of 2,500m<sup>3</sup>/day and recovery test

Water Quality Examination; to include pH, SO<sub>4</sub>, N, P, Hg, Cl, etc.

d) Observation Well

Water Level Indicator (self or manual recording) shall be installed.



### 7.7.2 Spacing Allocation for Level II and III Wells

The pumping rates required for Level I facilities are fairly lower than that for Level II and III systems. The well interference in Level I facilities need not to be studied in terms of spacing of wells and production rate, since most formations in shallow and deep well areas generally have enough groundwater development potential. As Level II and III wells are usually expected to produce larger discharge to meet the water demand, the spacing of wells to avoid well interference has to be considered. Spacing allocation for Level II and III wells was examined considering specific capacity, pumping rate, and assumed drawdown of 1cm at the interference radius for a pumping duration of 16 hours.

#### (1) Specific Capacity

According to the existing well source information, specific capacity was considered with ranges from 0.5 lpsm to 6.5 lpsm. To simplify the calculation, an average value in each range is adopted in the calculation of interference radius.

#### (2) Pumping Rate

The pumping rate was estimated by assuming a drawdown of 10m with the average value of specific capacity and pump operation of 16 hours/day. The formula used to determine proper well spacing is the Jacob modified equation. Drawdown at the interference boundary is assumed at 1cm after a pumping duration of 16 hours.

Table 7.7.1 presents the estimated spacing requirements and number of wells to be constructed within a well field of one km<sup>2</sup>. The spacing interval between adjacent wells to avoid well interference is planned to be more than twice the distances of the calculated interference radius.

Table 7.7.1 Spacing Arrangements for Planned Wells

Range of Specific Capacity (lpsm)	Estimated Pumping Rate (m <sup>3</sup> /day)	Estimated Interference Radius (m)	Estimated Number of Wells/km <sup>2</sup>
0.5 - 1.5	500	80	45
1.5 - 3.0	1,000	120	20
3.0 - 4.5	2,000	160	11
4.5 - 6.0	2,500	200	7
> 6.0	>2,500	>200	>7