Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
1. Municipal Development Finance (MDF)	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.	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.	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 GFIs stopped lending to the LGUs on account of mounting uncollectible accounts. During this time, the MDF channeled some ₱7.9 billion of long-term finance to LGUs. LGU projects that have benefited from assistance from the MDF include: • public markets • heavy equipment and machinery • bus terminals • slaughterhouses • drainage and waterworks • roads • solid waste • telephone systems • health centers At present, nine loans have been provided by the World Bank, ADB, OECF and Eximbank of Korea through the MDF. Total loans extended under the nine projects for all regions amounts to $290 million (₱10.7 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 and annual population growth rates, 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	**Terms of Credit.** 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. **Funding Limitation.** At the moment, MDF funding to the LGUs is experiencing constraints for several reasons: • the increased demand for MDF credits by other developing countries; • funding limitations of the multilateral institutions that support the MDF; • constraints imposed by the government budgetary process; and • increasingly limited eligibility for MDF assistance to the Philippines due to the increased economic development of the country. 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.

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
MDF (contd)			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.	**Assessment** The MDF continues to be a major source of concessionary 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 concessionary 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.
2. Local Water Utilities Administration (LWUA)	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. • provide loans to qualified local water utilities for their capital expenditure programs; 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.			

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
LWUA (contd)	• furnish technical assistance and personnel training programs for local water utilities; • effect systems integration, joint investments, water district annexation and de-annexation. 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).			
3. DBP	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.	To qualify under the Program, the province, municipality or city shall: 1. have beneficiary population of at least 10,000; 2. perform important local, commercial, transportation, industrial, educational or similar activities; 3. have gross annual average revenues of at least ₱3.0 million over the last three years; 4. have balanced or surplus prospective income streams for the next three years (computation to be validated by the concerned RMT/Branch); 5. have no adverse findings from banks and major suppliers both for the LGU and the current Chief Executive and Treasurer; and	1. 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; 2. 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.	**DBP Environmental Credit Facilities** 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. **Environmental Infrastructure Support Credit Program** 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.

Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
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	For the expanded operation, 4,000 out of 42,000 barangays will be targeted annually. 3. 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 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); 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); 6. The project shall be duly endorsed by the local council as evidenced by the relevant enabling resolution	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. **Industrial Pollution Control Loan Project** 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. More or less, both EISCP and IPCLP carry the same features, terms and conditions **Comparative Features of Environmental Infrastructure Support Credit Program and Industrial Pollution Control Loan Project** *Amount:* Yen 5.158 Billion (United Facility) DM 10 Million (United Facility) *Loan Denomination:* Pesos *Purpose:* 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 *Eligible Borrowers:* 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 ₱60 million or less. *Interest Rate to End-Users :* 11% fixed p.a. *Tenor:* 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. *Loan Size:* 80% of total project cost Maximum of 70% of the total investment cost or P24 million whichever is lower.

Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
DBP (contd)				*Eligible Projects* Four basic types of pollution control projects: • Pollution treatment • Pollution minimization / clean technology • Toxic and hazardous waste substance management • Solid waste management 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. **THE CREDIT LOAN PROCESS** 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. 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. **a. Amount of Loan:** a. Window III Loans 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. 2. PCCD-CEP Projects – ₱1.5 million per Barangay Business Center.

Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
DBP (contd)				b. Loans Secured by Deposits – 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" **b. Terms of Payment:** a. Window III Loans 1. Revenue-Generating Projects – 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. 2. PCCD-CEP Projects – 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. b. Loans Secured by Deposits – Maximum of five (5) years payable monthly **c. Interest Rate:** a. Window III Loans – 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 then "AAAA". 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. b. Loans Secured by Deposits – Based on the formula prescribed in ALMA Circular No. 01-95 covering the Revised Guidelines from Loans Secured by Deposits. **d. Drawdown:** 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.

Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
DBP (contd)				**e. Collateral Requirements:** <u>For Window III Loans:</u> Loans with maturities beyond 5 years shall be secured by: a. 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; b. Such other collateral or security arrangements as may be acceptable to DBP. Loans with maturities of up to 5 years shall be on best effort basis. In addition, the following shall be obtained: a. 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; b. Assignment of profits or income from the project to be financed until the loan is fully paid; c. 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. <u>For Loans Secured by Deposits:</u> 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. **f. Other Conditions** a. 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. b. The LGU shall maintain Special Depository Account under the General Fund, where repayment of obligations to DBP shall tale precedence after operating expenses of the project. Only when the debt amortizations have been satisfied will excess from part of the General Fund.

Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
DBP (contd)				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 d. The LGU shall execute a Deed or Undertaking making DBP its main depository bank 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 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 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 h. The LGU shall commit to establish a project office with full-time staff and operating budget for project preparation/ implementation. 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 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 k. The LGU shall submit resolution passed by the appropriate Sanggunian Board (Panlalawigan, Panlunsod or Pambayan) expressly authorizing the following

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
DBP (contd)				1. 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
4. Philippine National Bank (PNB)	**Purpose of the Loan:** 1. To finance the establishment, development, or expansion of income generating projects such as: a) Revenue-Generating/Cost Savings • Public Market • Trading Center/ Terminal • Water System (Construction/Expansion) • Asphalt Plant • Heavy Equipment • Telephone System • Commercial System • Slaughterhouse • Grains Procurement/ Trading • Post-Harvest Facilities	**Prospects for Commercial Bank Lending to LGUs.** 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: • the increase in LGUs' share of the national wealth; • presence of a legal framework for LGU financing; • flexibility and expanded borrowing powers of LGUs under the LGC;		**Eligible Borrowers:** • Municipality • City • Province **Amount of the Loan** 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. **Term of Loan** 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. **Interest Rate** Interest rates shall be prime rate based subject to periodic interest resetting.

Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
PNB (contd)	b) Others • Irrigation • Renovation/Const. Of City/ Capital Town's Municipal Hall • Purchase of lots • Reclamation • Sports Complex • Diagnostic Equipment/Building • Road Construction/ Repair • Hospital Building with Pay Wards • School Building 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 GFI, 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.	• increasing financial sophistication of some LGUs (some provinces are exploring private foreign financial instruments), and • the growing market opportunity in financing LGU infrastructure requirements (some ₱20 billion are in the project pipeline of LGU BOT Projects). 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.		**Collaterals** • Assignment of applicable regular income of the LGU, Internal Revenue Allotment share of LGU and Net Revenue generated by the project financed. • Chattel Mortgage of Equipment Financed by the Loan. • Real Estate of Local Government Units. **Standard Conditions** **a. Common Condition** 1. Submission of a Resolution of the Sanggunian Bayan/ Panlungsod authorizing the loan and designating the Local Chief Executive (LCE) as the authorized signatory. The resolution should also contain the following: 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; 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; 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; 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 s fully paid and the PNB to debit the LGU deposit accounts to cover payment of its obligations; e) The duly notarized undertaking of the LGU to include in its annual budget its loan obligations with PNB. 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.

Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
PNB (contd)	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 (₱6.3 billion). Luzon projects accounted for 26% (P3.0 billion), Visayas, 10% (₱1.1 billion), and the rest was for Mindanao, 8% (₱0.8 billion). On a per project basis, Luzon Projects averaged ₱31.0 million per project; Mindanao, ₱22.2 million and the Visayas at ₱20.6 million per project. Majority of the loans lent to LGUs were for heavy equipment, infrastructure and public markets			2. Submission of a duly notarized certification by LGU that: a) the 20% limit provided under the law in the servicing of loan obligations have not been exceeded; b) Legible copies of the Loan Agreement and Security Agreement have been posted at the conspicuous place in the Municipality/City Hall/ Provincial Capitol; c) The proposed sources of repayment of the loan are available and not restricted by law. 3. PNB shall continue to be the LGU's principle depository Bank until such time the loan is fully paid. 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. 5. Undertaking by the LGU that they will not incur additional obligation/ indebtedness without the written consent of PNB which consent will not be unreasonably withheld. 6. Any amount in excess of the approved amount of loan shall be shouldered by the LGU. 7. Subject to SEL Cir. 4-315/94 of May 17, 1994 on Interest Rate Setting and Adjustments. 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. 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. **b. Loans for Machinery/Equipment/Vehicle** 1) 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. 2) If to be imported, the letter of credit shall be opened at the Bank and the loan proceeds be equivalent to the a) corresponding import bill upon negotiation computed at the prevailing selling rate at the time of negotiation.

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
PNB (contd)				b) amount of the LC in case of cash LC computed at the prevailing selling rate on the LC opening date. 1) LGU to execute a chattel mortgage on the equipment within 60 days upon acquisition. 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. **For Construction/Development Loans** 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. 2) Where the contract calls for a mobilization outlay, such amount for initial release shall not exceed 15% of the approved loan. 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. 4) PNB shall have the option to buy or lease space of its choice for a branch site within the project to be financed. **Terms of Credit.** 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. 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 IRA share of the LGU. The term of the loan is generally

Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
PNB (contd)				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.
5. Land Bank of the Philippines (LBP)	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 ₱134 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 The Land Bank's LGU program has financed projects in various sectors amounting to over ₱11.6 billion as of March 1997, primarily in infrastructure, bus terminals, public markets telecommunications, housing, water systems, road construction and traffic systems.	Pre-Release Requirements 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. a. Borrowing Resolution. Passed by the Sangguniang Panglungsod and expressly: • 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; • Designating the person authorized to negotiate and sign all documents pertaining to the loan; • 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; • 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; • Directing the LGU Treasurer and the accountant to enter the loan in the appropriate books of the LGU;		**Terms of Credit.** 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.

Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
LBP (contd)	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 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	• 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; • Appropriating the amount for loan repayment on the LGU's annual budget until the loan, interest and other charges are fully paid; • Undertaking by the LGU to secure from DBM a written certification of its commitment to withhold the LGU's IRA in favor of LBP in the event of payment default; • 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. **Processing Requirements** a. Sangguniang Resolution authorizing the Local Chief Executive to negotiate a loan with LBP b. Budget for the Current Year c. COA Audited Financial Statements for the past 3 years d. List of Elected Officials and Key officers e. Schedule of LGU's IRA for the past 2 years f. Feasibility Study g. Regular Documentary Requirements pertaining to offered collaterals h. For Projects involving Construction • Cost estimates • Plans and specifications		

Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
LBP		• Bill of materials • Work program /schedule duly approved by the Local Chief Executive and the City/District Engineer i. For Acquisition of Machinery and Equipment • List of Machinery and Equipment, its Description & Estimated Cost based on Firm Quotation • Guarantee from the Dealers/ Suppliers as the Availability of Spare parts in the Local Market		
6. Municipal Bond Flotation (MBF)	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	**Legal Framework for Bond Flotations.** 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 theconstruction of a city or municipal hall or payment of staff salaries.		**Bond Flotations Issued.** 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 ₱300 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. Since the Cebu bond flotation, there have been five more issues (all in the housing sector): • Victorias Pabahay Bonds - Negros Occidental (₱8.0 million) • Legazpi Suerte Bonds - Albay (₱26.0 million) • Claveria Housing Bonds - Misamis Oriental (₱20.0 million) • Sto. Domingo Housing Bonds - Nueva Ecija (₱10.0 million) • Puerto Princesa Housing Bond Palawan (₱20.0 million)

Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
MBF (contd)		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. **National Government Guarantee.** 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. 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.		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.

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
MBF (contd)		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.		
7. Build-Operate-Transfer (BOT)	BOT or "Build-Operate-Transfer" is a project-financing scheme that uses private investment to undertake infrastructure projects historically financed and implemented by the public sector. 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. 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	**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). **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.		**Characteristics:** • A private company or consortium is given the right to build and operate a facility previously provided for by the government • The private company is responsible for financing, design' constructing, operating and maintaining the project; • 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. **Advantages:** • BOT offers an alternative source of financing; • A transparent legal framework already exists for BO financing; • LGUs benefit from a project with a typical no or very little initial investment; • BOT schemes offer proper allocation of risks; • BOT projects usually result in better and reliable service and consistent supply; • Long concession period and contractual agreements assure project sustainability; • Technology and skills transfer usually result from BOT projects; • BOT Projects may stimulate local capital market development.

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
BOT (contd)	to solicit investor interest in the project and undergo the processing procedures prescribed under the BOT Law and the LGC.	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. Concerning countrywide 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 ₱7billion, 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.		
8. LGU Guarantee Corporation (LGUGC)	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).	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,	**Joint Ventures** 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	**Others Forms of Private Sector Participation in LGU Infrastructure Projects** 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

Financing Source	Objectives	Prequalification	Elligible Projects	Loan Features
LGUGC (conntd)	The LGUGC 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. Ultimately, the LGUGC 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 LGUGC'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.	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 LGU's 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 LGUGC are as follows: • expand the LGUs' borrowing capacity and credit availability; • reduce the LGUs' financing costs; • improve the operating and financial flexibility of the LGUs; • reduce the credit and other perceived risks (e.g. political risk) of lenders; and • contribute to the development of the local capital market by creating a market for a variety of credit instruments. The corporation is capitalized at ₱500 million with paid up capital of ₱250 million. As a first step, the LGUGC will set-up an LGU database, and develop internal LGU credit rating system. Next, the LGUGC will accredit financial institutions which have expressed interest in participating in the guarantee program as investing banks. Finally, the LGUGC will receive and process the guarantee applications from the appropriate bank under the BAP, which will provide financing for the LGU project. In case of default by the LGU on the loan, the guarantee can be called or a restructuring exercise undertaken by the leading financial institution. The guarantee facility will have a gearing ratio of 10 times its paid-in capital; therefore, it can provide guarantees of up to ₱2.5 billion. Initially, the LGUGC can provide a credit guarantee of up to 85% of the LGU loan until a credit rating mechanism is put in place. Based on recent discussions, LGUs are excited about the prospects of obtaining a guarantee facility for its loans to finance its various projects.	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 comparison, 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.	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: • **Service contracts** 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. • **Management contracts** 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. • **Leases or affermage contracts** 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. Commercial risk is borne by the contractor. • **Concessions** 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. • **BOT contracts** 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). • **Divestiture** involves the outright sale of a utility's assets to the private sector. 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.

Financing Source	Objectives	Prequalification	Eligible Projects	Loan Features
9. NDC – Agri-Agra Erap Bonds	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.		**Project Selection/Evaluation Criteria** NDC is open to partnership with the private sector. The projects should conform with the following set of guidelines: 1. The project should be for agri-agra development. 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. 3. It should be larger than those classified under the Small and Medium Enterprises with a project cost greater than ₱60 million. 4. It should be ready for implementation with identified specific site, with definite proponent and is accessible to major infrastructure. 5. The project selection shall ensure diversity of products, sectors, and geographical location. 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. 7. The project should directly or indirectly benefit farmers and marginalized communities in line with the "ERAP Para sa Mahirap thrust. 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. 9. The proponents should be able to show its financial capability and ability to access market of product. 10. The project should have a clear exit mechanism for NDC. 11. It should be environment-friendly and have necessary environmental controls.	

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 1:650,000 (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.

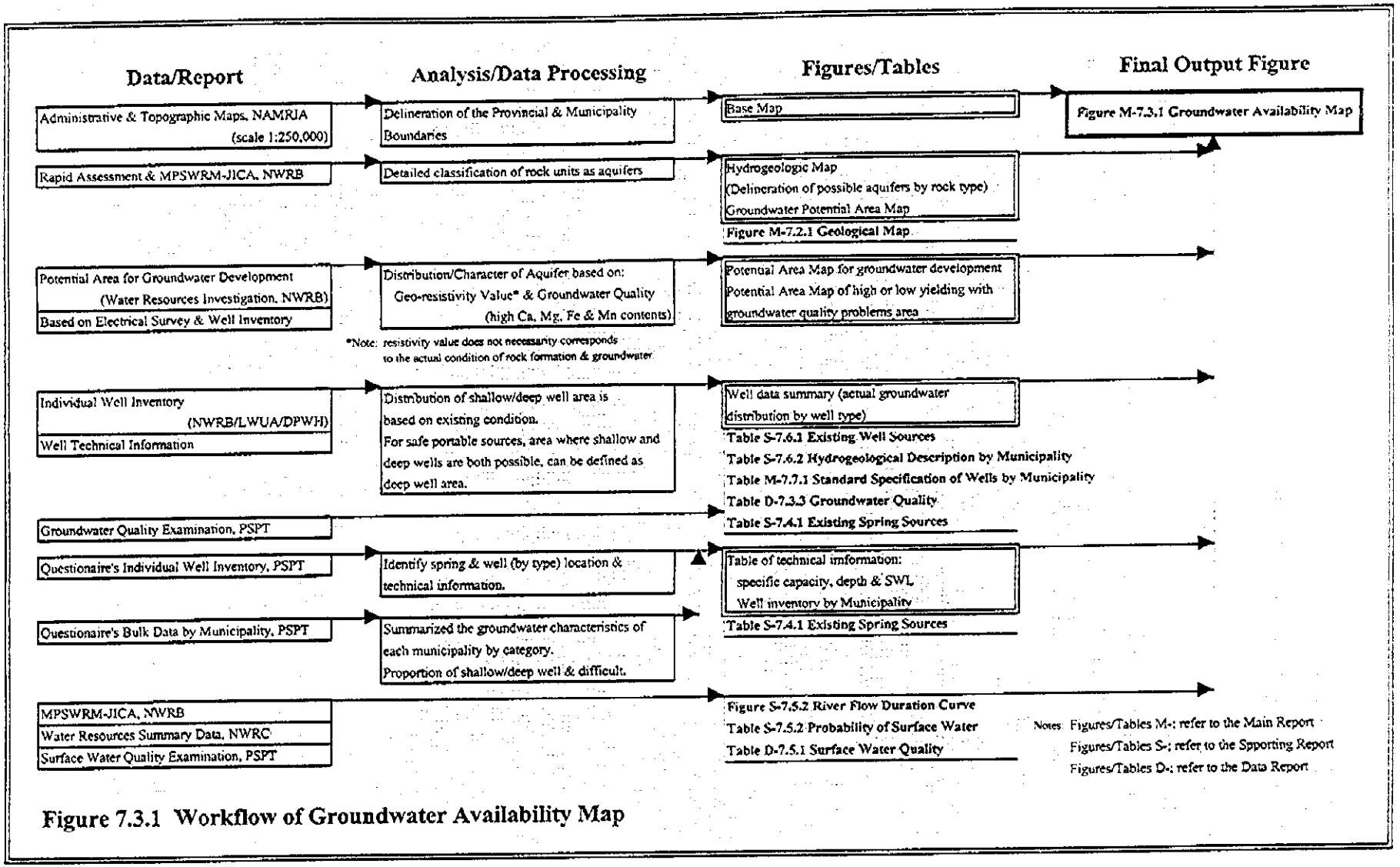

Figure 7.3.1 Workflow of Groundwater Availability Map

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.

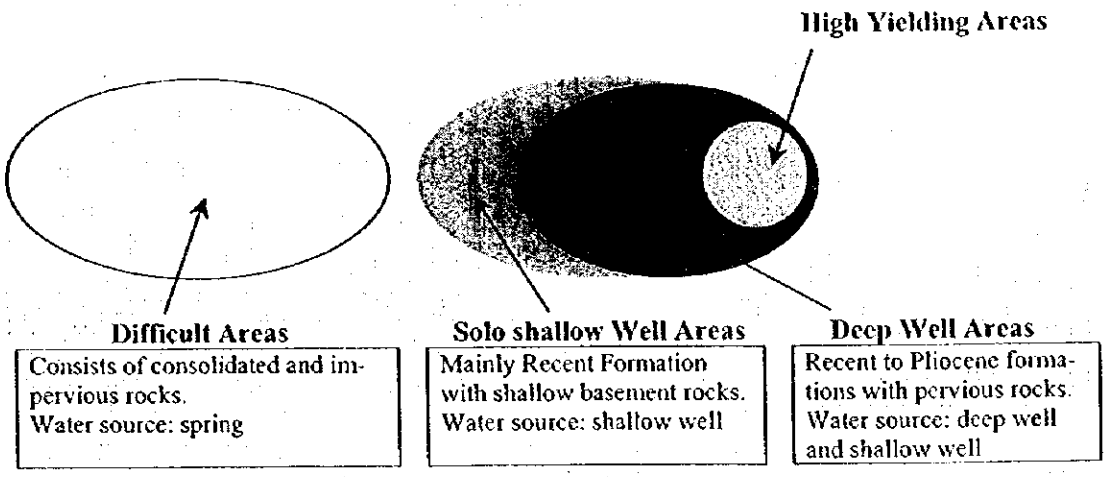

Figure 7.3.2 Area Category by Groundwater Utilization

Solo shallow well areas are defined on the following basis:

(a) Predominance of serviceable shallow wells and presence of deep wells with water quality problem and/or low yielding aquifers.

(b) Occurrence of impervious rocks beneath the Recent formation at shallow depth.

5) Based on the information provided by 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	No. of Developed Spring		Untapped Spring		
	Q<2.8lps	Q>2.8lps	No.	Ave. lps	Range lps
Allen	5	0	0		~
Biri	12	0	0		~
Bobon	0	0	0		~
Capul	8	1	0		~
Catarman	2	0	0		~
Catubig	24	0	0		~
Gamay	9	0	0		~
Laoang	4	0	0		~
Palinig	5	0	0		~
Las Navas	14	0	0		~
Lavezares	25	1	0		~
Lope de Vega	12	0	0		~
Mapanas	0	0	0		~
Mondragon	3	0	0		~
Palapag	8	0	0		~
Pambujan	5	0	0		~
Rosario	3	0	0		~
San Antonio	4	1	0		~
San Isidro	7	3	0		~

Table 7.4.1 Existing Spring Sources

(cont'd)

Municipality	No. of Developed Spring		Untapped Spring		
	Q<2.8lps	Q>2.8lps	No.	Ave. lps	Range lps
San Jose	0	0	0		~
San Roque	3	0	0		~
San Vicente	1	0	0		~
Silvino Lobos	8	0	0		~
Victoria	15	0	0		~

Notes: Ave. lps & Range lps mean the average discharge and the range of discharges in lps (liter/second), respectively.
The information of untapped spring source was not available during data collection period of the study.

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 been utilized for domestic purpose,
- rivers which have gauging stations, and
- rivers with watershed of 100 km^2 or more.

Based on the above criteria, the selected major rivers are Gamay, Catubig, Pambujan, Bugko, Catarman, Bobon and Mawo Rivers as shown in Figure 7.5.1 River Network Map.

The gauging stations in the province are located at the Catubig, Catarman, Bobon and Mawo 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 major rivers total to 1.77 m^3/sec. The major diversion points, operated by private association, are located in Catarman (Catarman River), Catubig (Catubig River), and San Roque (Pambujan River). Mining sites are located in the mountainous area especiallyin Lope de Vega, Silvino Lobos and Las Navas. However, the provincial DENR does not properly manage the information on operation status, type of products, locations and environmental influence.

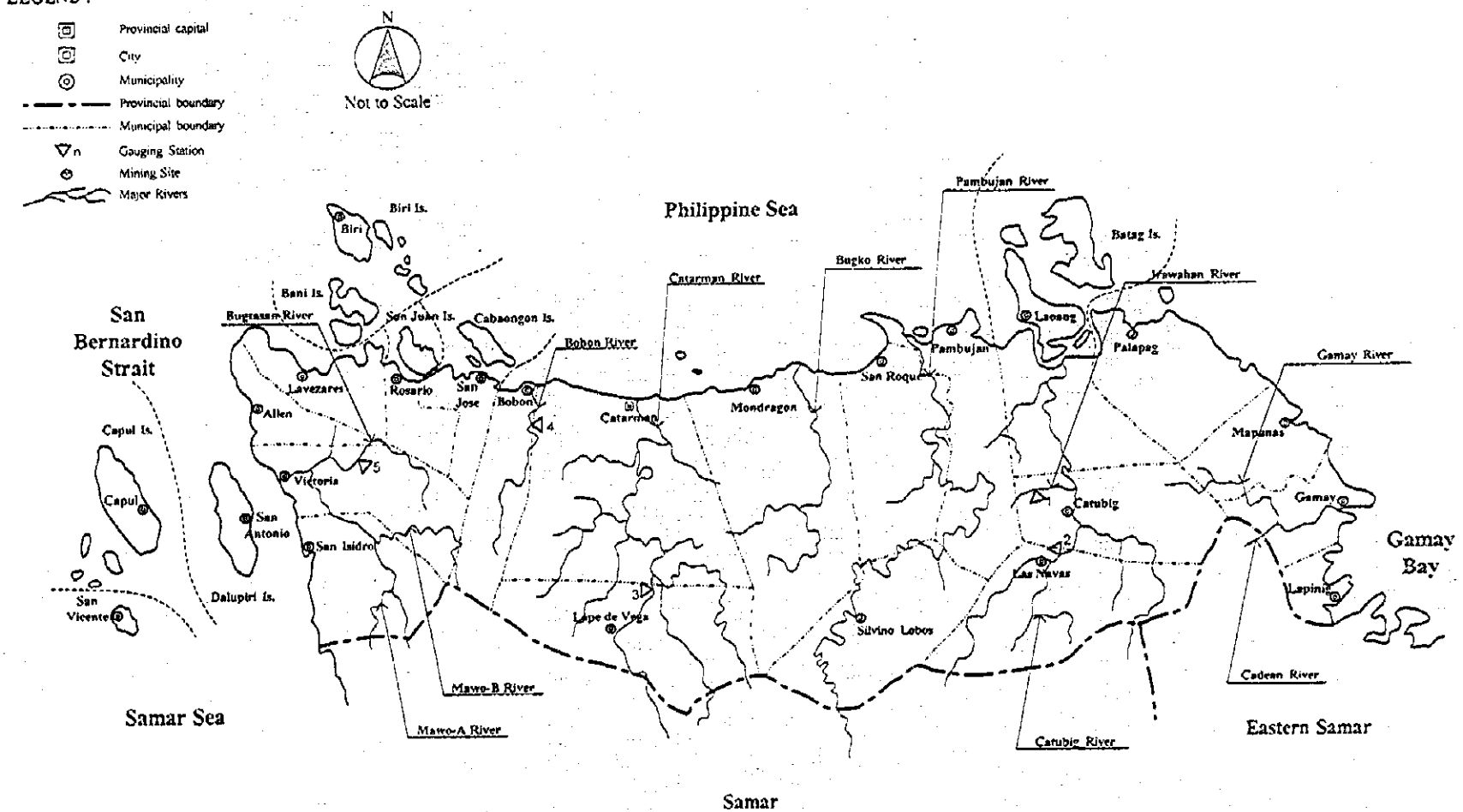

Figure 7.5.1 River Network Map
Province of Northern Samar

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

River Basin		Information from Gauging Station						Surface Water Use (Water Rights) in Watershed				
Major River	Stream & Main Systems	Drainage*1 sq.km	Location No. in Figure 7.5.1	River Flow Rate (Q: cum/sec) Peak Qp	Max. Qdx	Mini. Qdn	Data Period	Municipality in watershed	Domestic cum/sec	Industrial cum/sec	Irrigation cum/sec	Others*3 cum/sec
Gamay	Cadean	Nogauging station exists.						(Eastern Samal)*5	NR*4	NR*4	NR*4	NR*4
								Gamay	NR*4	NR*4	NR*4	NR*4
	Gamay	Nogauging station exists.						Catubig	NR*4	NR*4	NR*4	NR*4
								Mapanas	NR*4	NR*4	NR*4	NR*4
								Gamay	NR*4	NR*4	NR*4	NR*4
Catubig		252.0	(2): San Isidoro	237.34	229.43	8.56	1955-'69	(Samal)*5	NR*4	NR*4	NR*4	NR*4
		19.0	(1): Hirawahan	101.57	81.16	0.08	1957-'70	Las Navas	NR*4	NR*4	NR*4	NR*4
								Catubig	0.01	-	0.42	-
								Laoang	NR*4	NR*4	NR*4	NR*4
Pambujan		No gauging station exists.						(Samal)*5	NR*4	NR*4	NR*4	NR*4
								Silvino Lobos	NR*4	NR*4	NR*4	NR*4
								Pambujan	NR*4	NR*4	NR*4	NR*4
								San Roque	-	-	0.15	-
								Pambujan	NR*4	NR*4	NR*4	NR*4
Bugko		No gauging station exists.						Mondragon	-	-	0.07	-
Catarman		472.0	(3): Polangui	900.26	863.20	3.03	1959-'70	(Samal)*5	NR*4	NR*4	NR*4	NR*4
								Lope de Vega	NR*4	NR*4	NR*4	NR*4
								Catarman	-	-	1.00	-
Bobon		91.0	(4): Casulgan	123.12	120.84	0.50	1958-'70	Catarman	NR*4	NR*4	NR*4	NR*4
								Bobon	-	-	0.09	-
Mawo	Mawo-B	No gauging station exists.						Bobon	NR*4	NR*4	NR*4	NR*4
								Victoria	-	-	-	-
								San Isidoro	-	-	-	-
	Mawo-A	No gauging station exists.						(Samal)*5	NR*4	NR*4	NR*4	NR*4
								San Isidoro	-	-	0.03	-
								Victoria	-	-	-	-
	Bugtasan	138.0	(5): San Roque	98.56	87.91	4.34	1968-'70	Rosario	NR*4	NR*4	NR*4	NR*4
								Victoria	-	-	0.02	-

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

Notes: Drainage*1 : Watershed Area at Gauging Station
NA*2 : Recorded River Gauge Hight 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
Qdx : Maximum Daily Discharge of Weighted Daily Discharge
Qdn : Minimum Daily Discharge of Weighted Daily Discharge

(2) River Flow Analysis

Flow duration curves, derived from 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.

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

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 "A" standard except a parameter of color, although the parameters tested are limited.

Percent of Time (%)	Specific Discharge (cum/sec/100sq km)				
	Catubic-Hirawahan River	Catubig River	Catarman River	Bobon River	Mawo River
(No. in Figure 7.5.1)	1	2	3	4	5
10%	25.15	32.07	16.62	24.41	9.39
20%	13.06	22.33	10.10	16.05	7.69
30%	7.34	16.71	7.21	9.05	6.93
40%	4.62	12.92	5.47	7.10	5.98
50%	3.37	10.44	4.49	4.40	5.65
60%	2.43	8.04	3.70	3.52	5.25
70%	1.71	6.42	2.63	2.91	5.17
80%	1.16	5.14	2.07	2.03	4.91
90%	0.74	4.29	1.72	1.55	4.52
100%	0.32	3.05	0.64	0.20	3.17
Data Period	1957-'70	1955-'69	1959-'70	1958-'70	1968-'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

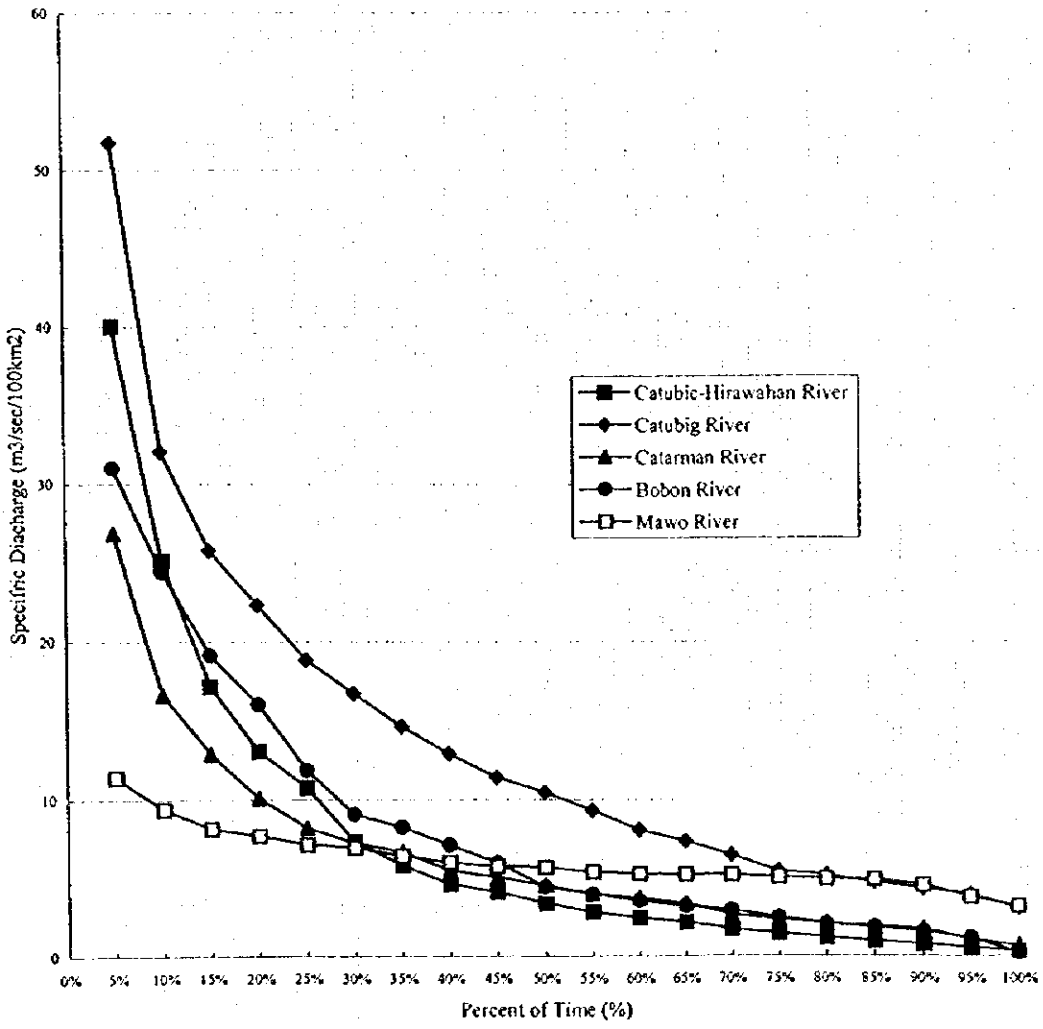

Figure 7.5.2 River Flow Duration Curve

Table 7.5.2 Probability of Surface Water

Surface Water Sources		Related Data						Probability of Surface Water (10-year returen-period)							
				Watershed Area in		Sp. D (return-period)		Inlet Flow to Municipality				Outlet Flow from Municipality			
Major River	System & Main	Location Municipality & other Province	River Connection	Location (1)	Upstream (2)	10-year (3)	5-year (4)	S/Flow (5)	M/Flow (6)	Use (7)	**Potential (8)**	S/Flow (9)	M/Flow (10)	Use (11)	**Potential (12)**
		upstream to down	outlet/inlet	sq.km	sq.km	Q	Q	cu.m/sec	cu.m/sec	cu.m/sec	cu.m/sec	cu.m/sec	cu.m/sec	cu.m/sec	cu.m/sec
Gamay	Cadean	Gamay	to Cadahonan	21.92	16.44	0.74	1.16	0.12	0.02	0.00	**0.10**	0.28	0.04	0.00	**0.24**
	Gamay	Catubig		67.54	0.00	0.74	1.16	0.00	0.00	0.00	**0.00**	0.50	0.08	0.00	**0.42**
		Mapanas		38.72	67.54	0.74	1.16	0.50	0.08	0.00	**0.42**	0.78	0.12	0.00	**0.66**
		Gamay	from Main	54.81	144.63	0.74	1.16	1.07	0.17	0.00	**0.90**	1.47	0.23	0.00	**1.24**
Catubig		Las Navas		210.80	60.23	0.74	1.16	0.44	0.07	0.00	**0.37**	2.00	0.31	0.00	**1.68**
		Catubig		196.48	271.03	0.74	1.16	2.00	0.31	0.00	**1.68**	3.44	0.54	0.43	**2.47**
		Laoang		150.87	467.51	0.74	1.16	3.44	0.54	0.43	**2.47**	4.56	0.72	0.43	**3.41**
Pambujan		Silvino Lobos		205.52	98.09	0.74	1.16	0.72	0.11	0.00	**0.61**	2.24	0.35	0.00	**1.89**
		Pambujan		62.93	303.61	0.74	1.16	2.24	0.35	0.00	**1.89**	2.70	0.42	0.00	**2.28**
		San Roque		126.14	366.53	0.74	1.16	2.70	0.42	0.00	**2.28**	3.63	0.57	0.15	**2.91**
		Pambujan		38.73	492.67	0.74	1.16	3.63	0.57	0.15	**2.91**	3.92	0.62	0.15	**3.15**
Bugko		Mondragon		210.43	0.00	1.72	2.07	0.00	0.00	0.00	**0.00**	3.61	0.44	0.07	**3.10**
Catarman		Lope de Vega		248.80	117.85	1.72	2.07	2.02	0.24	0.00	**1.78**	6.29	0.76	0.00	**5.53**
		Catarman		405.50	366.65	1.72	2.07	6.29	0.76	0.00	**5.53**	13.25	1.60	1.00	**10.65**
Bobon		Catarman		55.55	0.00	1.55	2.03	0.00	0.00	0.00	**0.00**	0.86	0.11	0.00	**0.75**
		Bobon		88.21	55.55	1.55	2.03	0.86	0.11	0.00	**0.75**	2.23	0.29	0.09	**1.85**
Mawo	Mawo-B	Bobon		9.29	0.00	4.52	4.91	0.00	0.00	0.00	**0.00**	0.42	0.05	0.00	**0.37**
		Victoria		41.49	9.29	4.52	4.91	0.42	0.05	0.00	**0.37**	2.29	0.25	0.00	**2.04**
		San Isidoro	to Mawo-A	7.31	50.78	4.52	4.91	2.29	0.25	0.00	**2.04**	2.62	0.29	0.00	**2.34**
	Mawo-A	San Isidoro	from Mawo-B	160.85	76.66	4.52	4.91	3.46	0.38	0.00	**3.09**	10.73	1.17	0.03	**9.53**
		Victoris	to Bugtasan	31.12	237.51	4.52	4.91	10.73	1.17	0.03	**9.53**	12.13	1.32	0.03	**10.79**
	Bugtasan	Rosario		9.03	0.00	4.52	4.91	0.00	0.00	0.00	**0.00**	0.41	0.04	0.00	**0.36**
		Victoris	from Mawo-A	124.47	277.65	4.52	4.91	12.54	1.36	0.03	**11.15**	18.17	1.97	0.05	**16.14**

Note Sp. D (Specific Discharge) was analyzed by montly mean flow records from gauging station.
S/Flow (Stream Flow) was estimated specific diacharge (10-year return-period) multilied 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 4,852 existing wells in the province, while 74 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 some technical information. All well data include information on well depth, however, static water level and specific capacity are not covered in most of the well data. In addition, well data collected do not cover the entire province as summarized in Table 7.6.1.

Table 7.6.1 Existing Well Sources

Municipality	Type	No.	Depth (m)		SWL (mbgs)		Sp. Cap. (lpsm)	
			Ave.	Range	Ave.	Range	Ave.	Range
Allen	DW	0		-		-		-
	SW	0		-		-		-
Biri	DW	0		-		-		-
	SW	0		-		-		-
Bobon	DW	0		-		-		-
	SW	0		-		-		-
Capul	DW	0		-		-		-
	SW	0		-		-		-
Catarman	DW	0		-		-		-
	SW	0		-		-		-
Catubig	DW	0		-		-		-
	SW	0		-		-		-
Gamay	DW	0		-		-		-
	SW	13	7.9	6.0 - 12.0	3.0	3.0 -		-
Laoang	DW	0		-		-		-
	SW	0		-		-		-
Lapinig	DW	0		-		-		-
	SW	0		-		-		-
Las Navas	DW	0		-		-		-
	SW	0		-		-		-
Lavezares	DW	0		-		-		-
	SW	0		-		-		-
Lope de Vega	DW	0		-		-		-
	SW	0		-		-		-

Table 7.6.1 Existing Well Sources

(cont'd)

Municipality	Type	No.	Depth (m)		SWL (mbgs)		Sp. Cap. (lpsm)	
			Ave.	Range	Ave.	Range	Ave.	Range
Mapanas	DW	0		-		-		-
	SW	7	7.2	6.0 - 12.0	3.0	3.0 -	-	-
Mondragon	DW	0		-		-		-
	SW	24	8.6	6.0 - 12.0	3.0	3.0 -	-	-
Palapag	DW	0		-		-		-
	SW	23	18.8	15.0 - 19.0	3.6	3.0 - 6.0	-	-
Pambuan	DW	0		-		-		-
	SW	0		-		-		-
Rosario	DW	1	22.0	22.0 -	3.0	3.0 -	-	-
	SW	4	15.1	12.0 - 18.0	3.0	3.0 -	-	-
San Antonio	DW	0		-		-		-
	SW	0		-		-		-
San Isidro	DW	0		-		-		-
	SW	0		-		-		-
San Jose	DW	0		-		-		-
	SW	0		-		-		-
San Roque	DW	0		-		-		-
	SW	0		-		-		-
San Vicente	DW	0		-		-		-
	SW	0		-		-		-
Silvino Lobos	DW	2	32.1	30.0 - 35.0	3.0	3.0 -	-	-
	SW	0		-		-		-
Victoria	DW	0		-		-		-
	SW	0		-		-		-

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.

Legend; SWL=static water level, Sp.Cap.=specific capacity, Ave.=average, SW=shallow well and DW=deep well

The above well data are not bias to some municipalities and shallow wells. Therefore, considering the well general information and geologic background, the most productive wells are those with the depth ranging from 12m to 20m and from 30m to 50m. The good yielding wells have static water level varying from about 3m to 6mbgs and specific capacity of about 0.6 lpsm to 0.9 lpsm.

Based on hydraulic characteristics and location of wells in Northern Samar, aquifers are widely distributed along major rivers that originate from the Samar Central Highlands

Table 7.6.2 Hydrogeological Descriptions by Municipality

Municipality	Ground Information								Well Information						Groundwater Information						
	Topography			Geology					Depth		SWL		Sp.Cap.	L-III	Availability			Potential		Quality	
	Area Proportion (%)			Lithofacies (Major Aquifers)	Stratigraphy of Geological Age*				m		mbgs		lpsm		Area Proportion (%)			Comparative		Area Feature	
	Plain-Plateau	Hilly-Piedmont	Mountain		Q	Tertiary Neo.	Tertiary Paleo.	C	mini.	max.	mini.	max.	ave.	well	SW	DW	Diff.	Wells	Springs	Problem	Pollutants
Allen	8%	9%	83%	recent deposits & weathered sediments	X	X	X	X	-	-	-	-	-	0	14%	0%	86%	risky	rich	ironic	
Biri	100%	0%	0%	recent deposits & limestone	X	X			-	-	-	-	-	0	100%	0%	0%	fair	rich		
Bobon	100%	0%	0%	recent deposits & limestone	X	X			-	-	-	-	-	0	0%	100%	0%	good	poor	acidic & ironic	
Capul	30%	0%	70%	weathered sediments			X	X	-	-	-	-	-	0	20%	0%	80%	fair	rich	ironic	
Catarman	100%	0%	0%	recent deposits & limestone	X	X			-	-	-	-	-	2	0%	100%	0%	good	poor	acidic & ironic	
Catubig	100%	0%	0%	recent deposits & limestone	X	X			-	-	-	-	-	0	0%	100%	0%	good	rich	acidic & ironic	
Gamay	100%	0%	0%	recent deposits & limestone	X	X			6	12	3.0	3.0	-	0	0%	100%	0%	good	few	acidic & ironic	
Laoang	100%	0%	0%	recent deposits & limestone	X	X			-	-	-	-	-	0	26%	61%	13%	fair	poor	acidic & ironic	
Lapinig	100%	0%	0%	recent deposits & limestone	X	X			-	-	-	-	-	0	0%	100%	0%	good	few	acidic & ironic	
Las Navas	70%	30%	0%	recent deposits & limestone	X	X			-	-	-	-	-	0	0%	100%	0%	good	rich	acidic & ironic	
Lavezares	16%	41%	43%	recent deposits & limestone	X	X	X	X	-	-	-	-	-	0	3%	97%	0%	risky	rich	ironic	
Lope de Vega	70%	30%	0%	limestone	X	X			-	-	-	-	-	0	0%	100%	0%	poor	few	acidic & ironic	
Mapanas	100%	0%	0%	recent deposits & limestone	X	X			6	12	3.0	3.0	-	0	0%	100%	0%	fair	few	acidic & ironic	
Mondragon	100%	0%	0%	recent deposits & limestone	X	X			6	12	3.0	3.0	-	0	0%	100%	0%	good	poor	acidic & ironic	
Palapag	100%	0%	0%	recent deposits & limestone	X	X			15	19	3.0	6.0	-	0	0%	100%	0%	good	poor	acidic & ironic	
Pambujan	100%	0%	0%	recent deposits & limestone	X	X			-	-	-	-	-	0	0%	100%	0%	good	poor	acidic & ironic	
Rosario	100%	0%	0%	recent deposits & limestone	X	X			12	22	3.0	8.0	-	0	11%	89%	0%	good	poor	acidic & ironic	
San Antonio	30%	0%	70%	weathered sediments			X	X	-	-	-	-	-	0	20%	0%	80%	fair	rich	ironic	
San Isidro	7%	4%	89%	weathered sediments		X	X	X	-	-	-	-	-	0	1%	93%	6%	risky	rich	ironic	
San Jose	100%	0%	0%	recent deposits & limestone	X	X			-	-	-	-	-	0	18%	82%	0%	good	poor	acidic & ironic	
San Roque	100%	0%	0%	recent deposits & limestone	X	X			-	-	-	-	-	0	0%	100%	0%	good	poor	acidic & ironic	
San Vicente	100%	0%	0%	weathered sediments			X	X	-	-	-	-	-	0	100%	0%	0%	fair	few		
Silvino Lobos	60%	40%	0%	limestone	X	X			30	35	3.0	3.0	-	0	0%	100%	0%	fair	few	acidic & ironic	
Victoria	3%	29%	68%	recent deposits &	X	X	X	X	-	-	-	-	-	0	6%	41%	53%	risky	rich	ironic	

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 well

and flow to the Philippine Sea. Solo shallow well areas are distributed in western coastal plains and islets of the province. The Miocene and older rock units are widely distributed in the western mountain parts of the province that are classified as difficult area for groundwater development.

As indicated in Figure 7.3.1 Main Report, the river terraces made of fluviatile deposits are high yielding potential areas covering the central to eastern parts of the province. However, more than 70% of the numbers of shallow and deep wells in this mountainous area contain high Fe.

As alternative water sources, 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 are utilized for water supply and they originate from the Samar Central Highlands and the Western Mountain System in most parts of the province. Even the information of untapped spring sources were not available at present, such springs shall be sought for future water source development in the mountain areas.

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.

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. Application of such method for Level-I well is also justifiable, since inflow velocity of groundwater through the screen is very low due to 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
Catarman	80 m	90 %	10 %
Catubig	120 m	90 %	10 %
Las Navas	120 m	90 %	10 %
Mondragon	80 m	90 %	10 %
Palapag	80 m	90 %	10 %
San Roque	80 m	90 %	10 %

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 natural gravel packed method in future planning.

In the Samar Central Highlands area, it is reported by DPWH/DEO that numerous deep wells present high Fe contents (PNSDW; Fe<=1.0ppm). The groundwater in this Samar Central Highlands seems to contain high Fe and acid pH values based on examination results provided from the provinces of Samar and Eastern Samar. Ironic 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 values 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 quality shows an acid pH value. There is a possibility of iron contamination from steel materials.
(3) Iron concentration exceeds the PNSDW and 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 contain, the Iron Removal Facility shall be additionally installed. Where the parameter of groundwater indicates an acid pH side, the well mate-

rials 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 casing materials of the said anti-corrosive shall be used for deep wells. The development of deep well 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.

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
Catarman	80 m	70 %	30 %
Catubig	120 m	50 %	50 %
Las Navas	120 m	50 %	50 %
Lope de Vega	120 m	50 %	50 %
Mondragon	80 m	70 %	30 %
Pambujan	80 m	70 %	30 %
San Roque	80 m	70 %	30 %
Silvino Lobos	120 m	50 %	50 %

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.

(2) Spring

Untapped spring sources were not identified during data collection period. Data shall include barangay name, owner, discharge, transmission pipeline length and relative elevation (refer to the form to be used as shown in Table 7.6.5).

Table 7.6.5 Untapped Spring Sources Identified

Location		Untapped Spring			
Municipality	Barangay	Owner	Discharge (lps)	T.L.L.* (km)	Elevation Difference (m)
NP					

Note: T.L.L. - Transmission line length
NP - Data not provided

7.7 Water Source Development for Medium-Term Development Plan

7.7.1 Detailed Groundwater Investigation Required

(1) Preparation of Groundwater Database

There is a dearth of information on shallow and deep wells in the province. In most of the municipalities of the province, the standard specifications of wells are assumed from available information such as limited well data, geologic background, etc. Therefore, it is required that groundwater database is necessary to be prepare and studied for future detailed design of deep well. The parameters for the groundwater database will contain the following:

- Service Level; Level-I, Level-II, Level-III or Private
- Well Structures; Depth (m) & Diameter (mm) with Screen Position (m)
- Yielding; Static Water Level (m), Production Water Level (m) & Discharge (lps)
- Water Quality; to include of standard parameters of the PNSDW

(2) Test Well Investigation on Groundwater Potential in Deeper Aquifers (Limestone)

In deep well area, groundwater quality problem of high Fe content is reported with 70% of existing wells in central to eastern parts of the province. The coastal area exhibiting this groundwater quality problem is populated, especially in municipality of Catarman. At least three (3) test wells in urban areas shall be constructed for pumping test and water quality examination for future groundwater development. Recommended tasks entail the following:

- Test Well Site; Catarman, Mondragon and San Roque
- Test Well; at least one each in respective municipalities (total three deep wells)
- Tentative Well Design; depth of 150m, diameter of 200mm and screen length of 40m
- Pumping Test; Time Draw-down and Recovery Test with maximum discharge of 1,500 m^3/day
- Water Quality Examination; to include of Fe, Mn, pH, etc.
- Study; Groundwater Potential

(3) Spring Water Quality Examination in the Samar Central Highlands Area

Spring is a major water source in the municipalities of Catubig, Las Navas, Silvino Lobos and Lope de Vega. Some deep wells were used for drinking, but these wells have a deep water level of 60 mbgs to 100 mbgs.

Water quality of springs is reported as potable. However, mineral rich rocks are found in the provincial boundary area. Spring water quality shall also be examined for the parameters listed below for future spring development.

- Physical; Turbidity, Color & TDS
- Chemical; pH, Total Hardness, Alkalinity & Acidity
- Bacteriological; Bacteria & Coliform
- Major Cation; Na^+, K^+, Ca^+ & Mg^+
- Major Anion; CO_3^-, HCO_3^-, Cl^- & SO_4^-
- Trace Element; Cu, Fe & Mn

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^2. 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^3/day)	Estimated Interference Radius (m)	Estimated Number of Wells/km^2
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

FUTURE REQUIREMENTS AND DEVELOPMENT PLAN

B

Table 8.2.1 Estimation of Base Year Service Coverage of Water Supply

Name of Municipality	Area	Population (1998)	Population Served by 1998 Facilities				Population Served by Planned/On-going Projects				Population Served in the Base Year (1998)				
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Percentage Coverage
Allen	Urban	8,476			5,012	5,012							5,012	5,012	59
	Rural	10,336			5,538	5,538							5,538	5,538	54
	Total	18,812			10,550	10,550							10,550	10,550	56
Biri	Urban	2,596			1,598	1,598							1,598	1,598	62
	Rural	6,728			3,974	3,974							3,974	3,974	59
	Total	9,324			5,572	5,572							5,572	5,572	60
Bobon	Urban	5,041			3,581	3,581							3,581	3,581	71
	Rural	11,451			6,903	6,903							6,903	6,903	60
	Total	16,492			10,484	10,484							10,484	10,484	64
Capul	Urban	4,286		563	2,880	3,443						563	2,880	3,443	80
	Rural	5,827		416	3,562	3,978						416	3,562	3,978	68
	Total	10,113		979	6,442	7,421						979	6,442	7,421	73
Catarman (Capital)	Urban	31,015	2,567	192	19,799	22,558					2,567	192	19,799	22,558	73
	Rural	34,205	532		19,196	19,728					532		19,196	19,728	58
	Total	65,220	3,099	192	38,995	42,286					3,099	192	38,995	42,286	65
Catubig	Urban	4,649			2,306	2,306							2,306	2,306	50
	Rural	21,566		592	8,590	9,182						592	8,590	9,182	43
	Total	26,215		592	10,896	11,488						592	10,896	11,488	44
Gamay	Urban	2,753			1,426	1,426							1,426	1,426	52
	Rural	17,913			9,744	9,744							9,744	9,744	54
	Total	20,666			11,170	11,170							11,170	11,170	54
Laoang	Urban	11,104			8,137	8,137							8,137	8,137	73
	Rural	38,098			27,694	27,694							27,694	27,694	73
	Total	49,202			35,831	35,831							35,831	35,831	73
Lapinig	Urban	3,701			2,326	2,326							2,326	2,326	63
	Rural	6,629		172	3,891	4,063						172	3,891	4,063	61
	Total	10,330		172	6,217	6,389						172	6,217	6,389	62
Las Navas	Urban	6,254		373	2,770	3,143						373	2,770	3,143	50
	Rural	19,763		647	6,425	7,072						647	6,425	7,072	36
	Total	26,017		1,020	9,195	10,215						1,020	9,195	10,215	39

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

Name of Municipality	Area	Population (1998)	Population Served by 1998 Facilities				Population Served by Planned/On-going				Population Served in the Base Year (1998)				
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Percentage Coverage
Lavezares	Urban	3,433			2,231	2,231							2,231	2,231	65
	Rural	17,528		750	11,530	12,280						750	11,530	12,280	70
	Total	20,961		750	13,761	14,511						750	13,761	14,511	69
Lope De Vega	Urban	2,514		346	621	967						346	621	967	38
	Rural	10,314		851	1,627	2,478						851	1,627	2,478	24
	Total	12,828		1,197	2,248	3,445						1,197	2,248	3,445	27
Mapanas	Urban	2,161			1,208	1,208							1,208	1,208	56
	Rural	7,813			3,929	3,929							3,929	3,929	50
	Total	9,974			5,137	5,137							5,137	5,137	52
Mondragon	Urban	5,491			3,470	3,470							3,470	3,470	63
	Rural	21,357			16,105	16,105							16,105	16,105	75
	Total	26,848			19,575	19,575							19,575	19,575	73
Palapag	Urban	6,243			3,344	3,344							3,344	3,344	54
	Rural	20,286			10,187	10,187							10,187	10,187	50
	Total	26,529			13,531	13,531							13,531	13,531	51
Pambujan	Urban	9,970			5,999	5,999							5,999	5,999	60
	Rural	13,414		483	7,818	8,301						483	7,818	8,301	62
	Total	23,384		483	13,817	14,300						483	13,817	14,300	61
Rosario	Urban	2,412			2,399	2,399							2,399	2,399	99
	Rural	6,845			4,985	4,985							4,985	4,985	73
	Total	9,257			7,384	7,384							7,384	7,384	80
San Antonio	Urban	839			536	536							536	536	64
	Rural	7,413		49	5,308	5,357						49	5,308	5,357	72
	Total	8,252		49	5,844	5,893						49	5,844	5,893	71
San Isidro	Urban	2,834	908	82	1,145	2,135					908	82	1,145	2,135	75
	Rural	21,675	164	3,102	13,384	16,650					164	3,102	13,384	16,650	77
	Total	24,509	1,072	3,184	14,529	18,785					1,072	3,184	14,529	18,785	77
San Jose	Urban	3,088			1,918	1,918							1,918	1,918	62
	Rural	10,052		181	5,757	5,938						181	5,757	5,938	59
	Total	13,140		181	7,675	7,856						181	7,675	7,856	60

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

Name of Municipality	Area	Population (1998)	Population Served by 1998 Facilities				Population Served by Planned/On-going				Population Served in the Base Year (1998)				
			Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Level III	Level II	Level I	Total	Percentage Coverage
San Roque	Urban	8,378		91	5,501	5,592						91	5,501	5,592	67
	Rural	11,103		182	7,158	7,340						182	7,158	7,340	66
	Total	19,481		273	12,659	12,932						273	12,659	12,932	66
San Vicente	Urban	1,610			973	973							973	973	60
	Rural	4,423			3,680	3,680							3,680	3,680	83
	Total	6,033			4,653	4,653							4,653	4,653	77
Silvino Lobos	Urban	2,615		668	502	1,170						668	502	1,170	45
	Rural	9,053		120	2,701	2,821						120	2,701	2,821	31
	Total	11,668		788	3,203	3,991						788	3,203	3,991	34
Victoria	Urban	2,700		729	1,337	2,066						729	1,337	2,066	77
	Rural	9,327		874	5,478	6,352						874	5,478	6,352	68
	Total	12,027		1,603	6,815	8,418						1,603	6,815	8,418	70
Provincial Total	Urban	134,163	3,475	3,044	81,019	87,538					3,475	3,044	81,019	87,538	65
	Rural	343,119	696	8,419	195,164	204,279					696	8,419	195,164	204,279	60
	Total	477,282	4,171	11,463	276,183	291,817					4,171	11,463	276,183	291,817	61

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

Name of Municipality	Area	Population Served by 1998 Facilities				1998		2004	
		Level III	Level II	Level I	Total	Total Population	Coverage (%)	Total Population	Coverage (%)
Allen	Urban			5,012	5,012	8,476	59	10,431	48
	Rural			5,538	5,538	10,336	54	10,139	55
	Total			10,550	10,550	18,812	56	20,570	51
Biri	Urban			1,598	1,598	2,596	62	2,596	62
	Rural			3,974	3,974	6,728	59	7,686	52
	Total			5,572	5,572	9,324	60	10,282	54
Bobon	Urban			3,581	3,581	5,041	71	6,185	58
	Rural			6,903	6,903	11,451	60	11,754	59
	Total			10,484	10,484	16,492	64	17,939	58
Capul	Urban		563	2,880	3,443	4,286	80	4,487	77
	Rural		416	3,562	3,978	5,827	68	5,937	67
	Total		979	6,442	7,421	10,113	73	10,424	71
Catarman (Capital)	Urban	2,567	192	19,799	22,558	31,015	73	32,421	70
	Rural	532		19,196	19,728	34,205	58	40,153	49
	Total	3,099	192	38,995	42,286	65,220	65	72,574	58
Catubig	Urban			2,306	2,306	4,649	50	4,807	48
	Rural		592	8,590	9,182	21,566	43	23,553	39
	Total		592	10,896	11,488	26,215	44	28,360	41
Gamay	Urban			1,426	1,426	2,753	52	2,876	50
	Rural			9,744	9,744	17,913	54	20,318	48
	Total			11,170	11,170	20,666	54	23,194	48
Laoang	Urban			8,137	8,137	11,104	73	11,104	73
	Rural			27,694	27,694	38,098	73	41,789	66
	Total			35,831	35,831	49,202	73	52,893	68
Lapinig	Urban			2,326	2,326	3,701	63	4,285	54
	Rural		172	3,891	4,063	6,629	61	7,127	57
	Total		172	6,217	6,389	10,330	62	11,412	56
Las Navas	Urban		373	2,770	3,143	6,254	50	8,587	37
	Rural		647	6,425	7,072	19,763	36	19,493	36
	Total		1,020	9,195	10,215	26,017	39	28,080	36
Lavezares	Urban			2,231	2,231	3,433	65	3,433	65
	Rural		750	11,530	12,280	17,528	70	18,510	66
	Total		750	13,761	14,511	20,961	69	21,943	66
Lope De Vega	Urban		346	621	967	2,514	38	3,057	32
	Rural		851	1,627	2,478	10,314	24	11,615	21
	Total		1,197	2,248	3,445	12,828	27	14,672	23
Mapanas	Urban			1,208	1,208	2,161	56	2,788	43
	Rural			3,929	3,929	7,813	50	8,435	47
	Total			5,137	5,137	9,974	52	11,223	46
Mondragon	Urban			3,470	3,470	5,491	63	6,671	52
	Rural			16,105	16,105	21,357	75	22,987	70
	Total			19,575	19,575	26,848	73	29,658	66
Palapag	Urban			3,344	3,344	6,243	54	6,924	48
	Rural			10,187	10,187	20,286	50	22,914	44
	Total			13,531	13,531	26,529	51	29,838	45
Pambujan	Urban			5,999	5,999	9,970	60	11,779	51
	Rural		483	7,818	8,301	13,414	62	14,181	59
	Total		483	13,817	14,300	23,384	61	25,960	55
Rosario	Urban			2,399	2,399	2,412	99	2,412	99
	Rural			4,985	4,985	6,845	73	8,164	61
	Total			7,384	7,384	9,257	80	10,576	70
San Antonio	Urban			536	536	839	64	839	64
	Rural		49	5,308	5,357	7,413	72	7,974	67
	Total		49	5,844	5,893	8,252	71	8,813	67
San Isidro	Urban	908	82	1,145	2,135	2,834	75	3,119	68
	Rural	164	3,102	13,384	16,650	21,675	77	24,565	68
	Total	1,072	3,184	14,529	18,785	24,509	77	27,684	68
San Jose	Urban			1,918	1,918	3,088	62	3,188	60
	Rural		181	5,757	5,938	10,052	59	11,173	53
	Total		181	7,675	7,856	13,140	60	14,361	55
San Roque	Urban		91	5,501	5,592	8,378	67	9,239	61
	Rural		182	7,158	7,340	11,103	66	13,143	56
	Total		273	12,659	12,932	19,481	66	22,382	58
San Vicente	Urban			973	973	1,610	60	1,610	60
	Rural			3,680	3,680	4,423	83	4,555	81
	Total			4,653	4,653	6,033	77	6,165	75
Silvino Lobos	Urban		668	502	1,170	2,615	45	3,468	34
	Rural		120	2,701	2,821	9,053	31	9,540	30
	Total		788	3,203	3,991	11,668	34	13,008	31
Victoria	Urban		729	1,337	2,066	2,700	77	2,700	77
	Rural		874	5,478	6,352	9,327	68	10,866	58
	Total		1,603	6,815	8,418	12,027	70	13,566	62
Provincial Total	Urban	3,475	3,044	81,019	87,538	134,163	65	149,006	59
	Rural	696	8,419	195,164	204,279	343,119	60	376,571	54
	Total	4,171	11,463	276,183	291,817	477,282	61	525,577	56

Table 8.2.3 Number of Households Served by Sanitary Toilets in the Base Year (1998)

Name of Municipality	Area	Population (1998)	Number of Households (1998)	Households Using Sanitary Toilets in 1998				Recipient HHs of Planned/On-going Projects				Households Using Sanitary Toilets in the Base Year (1998)							
												Number				Coverage (%)			
				Flush Toilets	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total
Allen	Urban	8,476	1,685	10	986		996					10	986		996	1	59		59
	Rural	10,336	2,131		1,264		1,264						1,264		1,264		59		59
	Total	18,812	3,816	10	2,250		2,260					10	2,250		2,260		59		59
Biri	Urban	2,596	450	4	127		131					4	127		131	1	28		29
	Rural	6,728	1,154		320		320						320		320		28		28
	Total	9,324	1,604	4	447		451					4	447		451		28		28
Bobon	Urban	5,041	964	5	419		424					5	419		424	1	43		44
	Rural	11,451	2,241		1,315		1,315						1,315		1,315		59		59
	Total	16,492	3,205	5	1,734		1,739					5	1,734		1,739		54		54
Capul	Urban	4,286	837	2	416		418					2	416		418		50		50
	Rural	5,827	1,123		548		548						548		548		49		49
	Total	10,113	1,960	2	964		966					2	964		966		49		49
Catarman (Capital)	Urban	31,015	5,329	35	3,351		3,386					35	3,351		3,386	1	63		64
	Rural	34,205	6,503		4,049		4,049						4,049		4,049		62		62
	Total	65,220	11,832	35	7,400		7,435					35	7,400		7,435		63		63
Catubig	Urban	4,649	884	10	786		796					10	786		796	1	89		90
	Rural	21,566	4,204		3,573		3,573						3,573		3,573		85		85
	Total	26,215	5,088	10	4,359		4,369					10	4,359		4,369		86		86
Gamay	Urban	2,753	534	5	248		253					5	248		253	1	46		47
	Rural	17,913	3,499		1,533		1,533						1,533		1,533		44		44
	Total	20,666	4,033	5	1,781		1,786					5	1,781		1,786		44		44
Laoang	Urban	11,104	2,030	17	1,574		1,591					17	1,574		1,591	1	78		78
	Rural	38,098	7,327		5,353		5,353						5,353		5,353		73		73
	Total	49,202	9,357	17	6,927		6,944					17	6,927		6,944		74		74
Lapinig	Urban	3,701	616		262		262						262		262		43		43
	Rural	6,629	1,153		430		430						430		430		37		37
	Total	10,330	1,769		692		692						692		692		39		39
Las Navas	Urban	6,254	1,173	3	655		658					3	655		658		56		56
	Rural	19,763	4,042		2,588		2,588						2,588		2,588		64		64
	Total	26,017	5,215	3	3,243		3,246					3	3,243		3,246		62		62
Lavezares	Urban	3,433	654	10	517		527					10	517		527	2	79		81
	Rural	17,528	3,541		2,702		2,702						2,702		2,702		76		76
	Total	20,961	4,195	10	3,219		3,229					10	3,219		3,229		77		77
Lope De Vega	Urban	2,514	436	3	206		209					3	206		209	1	47		48
	Rural	10,314	1,696		816		816						816		816		48		48
	Total	12,828	2,132	3	1,022		1,025					3	1,022		1,025		48		48
Mapanas	Urban	2,161	400		183		183						183		183		46		46
	Rural	7,813	1,385		675		675						675		675		49		49
	Total	9,974	1,785		858		858						858		858		48		48
Mondragon	Urban	5,491	1,023	8	478		486					8	478		486	1	47		48
	Rural	21,357	4,107		2,010		2,010						2,010		2,010		49		49
	Total	26,848	5,130	8	2,488		2,496					8	2,488		2,496		48		49

Table 8.2.3 Number of Households Served by Sanitary Toilets in the Base Year (1998) (Cont'd.)

Name of Municipality	Area	Population (1998)	Number of Households (1998)	Households Using Sanitary Toilets in 1998				Recipient HHs of Planned/On-going Projects				Households Using Sanitary Toilets in the Base Year (1998)							
												Number				Coverage (%)			
				Flush Toilets	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total	Flush	Pour Flush	VIP/Dry	Total
Palapag	Urban	6,243	1,287	5	925		930					5	925		930		72		72
	Rural	20,286	3,962		2,765		2,765						2,765		2,765		70		70
	Total	26,529	5,249	5	3,690		3,695					5	3,690		3,695		70		70
Pambujan	Urban	9,970	1,713	9	753		762					9	753		762	1	44		44
	Rural	13,414	2,387		955		955						955		955		40		40
	Total	23,384	4,100	9	1,708		1,717					9	1,708		1,717		42		42
Rosario	Urban	2,412	363		221		221						221		221		61		61
	Rural	6,845	1,209		655		655						655		655		54		54
	Total	9,257	1,572		876		876						876		876		56		56
San Antonio	Urban	839	168		107		107						107		107		64		64
	Rural	7,413	1,522		914		914						914		914		60		60
	Total	8,252	1,690		1,021		1,021						1,021		1,021		60		60
San Isidro	Urban	2,834	532	5	258		263					5	258		263	1	48		49
	Rural	21,675	3,948		1,859		1,859						1,859		1,859		47		47
	Total	24,509	4,480	5	2,117		2,122					5	2,117		2,122		47		47
San Jose	Urban	3,088	579	8	359		367					8	359		367	1	62		63
	Rural	10,052	1,944		1,148		1,148						1,148		1,148		59		59
	Total	13,140	2,523	8	1,507		1,515					8	1,507		1,515		60		60
San Roque	Urban	8,378	1,338	10	961		971					10	961		971	1	72		73
	Rural	11,103	1,882		1,456		1,456						1,456		1,456		77		77
	Total	19,481	3,220	10	2,417		2,427					10	2,417		2,427		75		75
San Vicente	Urban	1,610	341		136		136						136		136		40		40
	Rural	4,423	955		367		367						367		367		38		38
	Total	6,033	1,296		503		503						503		503		39		39
Silvino Lobos	Urban	2,615	404		372		372						372		372		92		92
	Rural	9,053	1,532		252		252						252		252		16		16
	Total	11,668	1,936		624		624						624		624		32		32
Victoria	Urban	2,700	556	7	221		228					7	221		228	1	40		41
	Rural	9,327	1,923		649		649						649		649		34		34
	Total	12,027	2,479	7	870		877					7	870		877		35		35
Provincial Total	Urban	134,163	24,296	156	14,521		14,677					156	14,521		14,677	1	60		60
	Rural	343,119	65,370		38,196		38,196						38,196		38,196		58		58
	Total	477,282	89,666	156	52,717		52,873					156	52,717		52,873		59		59

Table 8.2.4 Number of Public School Student Served by School Toilets in Base Year (1998)

Name of Municipality	1998 Total Number of Public School Student	Standard No. of Student that can be Served by 1998	No. of Student to be Served by Planned /On-going Projects	Standard No. of Students that can be Served by Toilets in Base Year (1998)	Coverage (%)
Allen	3,928	560		560	14
Biri	2,252	680		680	30
Bobon	4,228	1,840		1,840	44
Capul	2,870	1,240		1,240	43
Catarman (Capital)	13,884	2,160		2,160	16
Catubig	5,693	2,640		2,640	46
Gamay	6,230	3,120		3,120	50
Laoang	9,837	3,600		3,600	37
Lapinig	2,874	400		400	14
Las Navas	5,502	1,440		1,440	26
Lavezares	5,404	1,400		1,400	26
Lope De Vega	2,227	1,080		1,080	48
Mapanas	2,548	520		520	20
Mondragon	4,528	1,200		1,200	27
Palapag	6,873	960		960	14
Pambujan	6,243	2,160		2,160	35
Rosario	2,391	2,391		2,391	100
San Antonio	2,200	800		800	36
San Isidro	5,635	2,800		2,800	50
San Jose	3,132	1,840		1,840	59
San Roque	3,652	1,480		1,480	41
San Vicente	1,450	1,360		1,360	94
Silvino Lobos	1,647	680		680	41
Victoria	3,337	720		720	22
Provincial Total	108,565	37,071		37,071	34

Table 8.2.5 Number of Public Utilities with Sanitary Toilets in the Base Year (1998)

Name of Municipality	Type	No. of PU with Toilets in 1998	No. of PU with Sanitary Toilets in 1998	No. of PU with Sanitary Toilets in Planned/On-going Projects	No. of PU with Toilets in Base Year 1998	No. of PU with Sanitary Toilets in Base year 1998	Coverage (%)
Allen	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total						
Biri	Public Market	1	1		1	1	100
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total	1	1		1	1	100
Bobon	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total						
Capul	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground	1	1		1	1	100
	Total	1	1		1	1	100
Catarman (Capital)	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total						
Catubig	Public Market	1	1		1	1	100
	Bus/Jeepney Terminal						
	Parks/Playground	2	2		2	2	100
	Total	3	3		3	3	100
Gamay	Public Market	1	1		1	1	100
	Bus/Jeepney Terminal						
	Parks/Playground	2	2		2	2	100
	Total	3	3		3	3	100

Table 8.2.5 Number of Public Utilities with Sanitary Toilets in the Base Year (1998) (Cont'd.)

Name of Municipality	Type	No. of PU with Toilets in 1998	No. of PU with Sanitary Toilets in 1998	No. of PU with Sanitary Toilets in Planned/On-going Projects	No. of PU with Toilets in Base Year 1998	No. of PU with Sanitary Toilets in Base year 1998	Coverage (%)
Laoang	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total						
Lapinig	Public Market	2			2		
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total	2			2		
Las Navas	Public Market	1			1		
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total	1			1		
Lavezares	Public Market	1	1		1	1	100
	Bus/Jeepney Terminal						
	Parks/Playground	1	1		1	1	100
	Total	2	2		2	2	100
Lope De Vega	Public Market	1	1		1	1	100
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total	1	1		1	1	100
Mapanas	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total						
Mondragon	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total						

Table 8.2.5 Number of Public Utilities with Sanitary Toilets in the Base Year (1998) (Cont'd.)

Name of Municipality	Type	No. of PU with Toilets in 1998	No. of PU with Sanitary Toilets in 1998	No. of PU with Sanitary Toilets in Planned/On-going Projects	No. of PU with Toilets in Base Year 1998	No. of PU with Sanitary Toilets in Base year 1998	Coverage (%)
Palapag	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground	1	1		1	1	100
	Total	1	1		1	1	100
Pambujan	Public Market	1	1		1	1	100
	Bus/Jeepney Terminal						
	Parks/Playground	2	2		2	2	100
	Total	3	3		3	3	100
Rosario	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total						
San Antonio	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total						
San Isidro	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total						
San Jose	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground	1	1		1	1	100
	Total	1	1		1	1	100
San Roque	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total						

Table 8.2.5 Number of Public Utilities with Sanitary Toilets in the Base Year (1998) (Cont'd.)

Name of Municipality	Type	No. of PU with Toilets in 1998	No. of PU with Sanitary Toilets in 1998	No. of PU with Sanitary Toilets in Planned/On-going Projects	No. of PU with Toilets in Base Year 1998	No. of PU with Sanitary Toilets in Base year 1998	Coverage (%)
San Vicente	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total						
Silvino Lobos	Public Market						
	Bus/Jeepney Terminal						
	Parks/Playground	1	1		1	1	100
	Total	1	1		1	1	100
Victoria	Public Market	1	1		1	1	100
	Bus/Jeepney Terminal						
	Parks/Playground						
	Total	1	1		1	1	100
Provincial Total	Public Market	10	7		10	7	70
	Bus/Jeepney Terminal						
	Parks/Playground	11	11		11	11	100
	Total	21	18		21	18	86

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

Name of Municipality	Area	No. of Household Served by Existing Facilities				Coverage in 1998						Coverage in 2004						
		Flush	Pour Flush	VIP/Dry	Total	No. of HHs	Percentage of Served Households				Served Population		No. of HHs	Percentage of Served Households				Served Population	
							Flush	Pour Flush	VIP/ Dry	Total	Number	%		Flush	Pour Flush	VIP/ Dry	Total	Number	%
Allen	Urban	10	986		996	1,685	1	59		59	5,001	59	2,074		48		48	5,426	48
	Rural		1,264		1,264	2,131		59		59	5,001	59	2,091		60		60	6,593	60
	Total	10	2,250		2,260	3,816		59		59	10,002	59	4,165		54		54	12,019	54
Biri	Urban	4	127		131	450	1	28		29	753	29	450	1	28		29	822	29
	Rural		320		320	1,154		28		28	727	28	1,318		24		24	2,013	24
	Total	4	447		451	1,604		28		28	1,480	28	1,768		25		26	2,835	26
Bobon	Urban	5	419		424	964	1	43		44	2,218	44	1,183		35		36	2,403	36
	Rural		1,315		1,315	2,241		59		59	2,974	59	2,300		57		57	7,229	57
	Total	5	1,734		1,739	3,205		54		54	5,192	54	3,483		50		50	9,632	50
Capul	Urban	2	416		418	837		50		50	2,143	50	876		47		48	2,217	48
	Rural		548		548	1,123		49		49	2,100	49	1,144		48		48	2,933	48
	Total	2	964		966	1,960		49		49	4,243	49	2,020		48		48	5,150	48
Catarman (Capital)	Urban	35	3,351		3,386	5,329	1	63		64	19,850	64	5,571	1	60		61	21,740	61
	Rural		4,049		4,049	6,503		62		62	19,229	62	7,634		53		53	23,394	53
	Total	35	7,400		7,435	11,832		63		63	39,079	63	13,205		56		56	45,134	56
Catubig	Urban	10	786		796	884	1	89		90	4,184	90	914	1	86		87	4,492	87
	Rural		3,573		3,573	4,204		85		85	3,952	85	4,591		78		78	19,733	78
	Total	10	4,359		4,369	5,088		86		86	8,136	86	5,505		79		79	24,225	79
Gamay	Urban	5	248		253	534	1	46		47	1,294	47	557	1	45		45	1,432	45
	Rural		1,533		1,533	3,499		44		44	1,211	44	3,968		39		39	8,771	39
	Total	5	1,781		1,786	4,033		44		44	2,505	44	4,525		39		39	10,203	39
Laoang	Urban	17	1,574		1,591	2,030	1	78		78	8,661	78	2,030	1	78		78	9,253	78
	Rural		5,353		5,353	7,327		73		73	8,106	73	8,036		67		67	29,913	67
	Total	17	6,927		6,944	9,357		74		74	16,767	74	10,066		69		69	39,166	69
Lapinig	Urban		262		262	616		43		43	1,591	43	713		37		37	1,733	37
	Rural		430		430	1,153		37		37	1,369	37	1,239		35		35	2,727	35
	Total		692		692	1,769		39		39	2,960	39	1,952		35		35	4,460	35
Las Navas	Urban	3	655		658	1,173		56		56	3,502	56	1,611		41		41	3,774	41
	Rural		2,588		2,588	4,042		64		64	4,003	64	3,986		65		65	13,583	65
	Total	3	3,243		3,246	5,215		62		62	7,505	62	5,597		58		58	17,357	58
Lavezares	Urban	10	517		527	654	2	79		81	2,781	81	654	2	79		81	2,903	81
	Rural		2,702		2,702	3,541		76		76	2,609	76	3,739		72		72	13,911	72
	Total	10	3,219		3,229	4,195		77		77	5,390	77	4,393		73		74	16,814	74
Lope De Vega	Urban	3	206		209	436	1	47		48	1,207	48	530	1	39		39	1,339	39
	Rural		816		816	1,696		48		48	1,207	48	1,910		43		43	5,610	43
	Total	3	1,022		1,025	2,132		48		48	2,414	48	2,440		42		42	6,949	42
Mapanas	Urban		183		183	400		46		46	994	46	516		35		35	1,082	35
	Rural		675		675	1,385		49		49	1,059	49	1,496		45		45	4,210	45
	Total		858		858	1,785		48		48	2,053	48	2,012		43		43	5,292	43

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

Name of Municipality	Area	No. of Household Served by Existing Facilities				Coverage in 1998							Coverage in 2004						
							Percentage of Served Households				Served Population			Percentage of Served Households				Served Population	
		Flush	Pour Flush	VIP/Dry	Total	No. of HHs	Flush	Pour Flush	VIP/ Dry	Total	Number	%	No. of HHs	Flush	Pour Flush	VIP/ Dry	Total	Number	%
Mondragon	Urban	8	478		486	1,023	1	47		48	2,636	48	1,242	1	38		39	2,843	39
	Rural		2,010		2,010	4,107		49		49	2,691	49	4,421		45		45	11,305	45
	Total	8	2,488		2,496	5,130		48		49	5,327	49	5,663		44		44	14,148	44
Palapag	Urban	5	925		930	1,287		72		72	4,495	72	1,428		65		65	4,990	65
	Rural		2,765		2,765	3,962		70		70	4,370	70	4,475		62		62	15,750	62
	Total	5	3,690		3,695	5,249		70		70	8,865	70	5,903		63		63	20,740	63
Pambujan	Urban	9	753		762	1,713	1	44		44	4,387	44	2,024		37		38	4,912	38
	Rural		955		955	2,387		40		40	3,988	40	2,523		38		38	5,913	38
	Total	9	1,708		1,717	4,100		42		42	8,375	42	4,547		38		38	10,825	38
Rosario	Urban		221		221	363		61		61	1,471	61	363		61		61	1,651	61
	Rural		655		655	1,209		54		54	1,302	54	1,442		45		45	4,123	45
	Total		876		876	1,572		56		56	2,773	56	1,805		49		49	5,774	49
San Antonio	Urban		107		107	168		64		64	537	64	168		64		64	570	64
	Rural		914		914	1,522		60		60	503	60	1,637		56		56	4,744	56
	Total		1,021		1,021	1,690		60		60	1,040	60	1,805		57		57	5,314	57
San Isidro	Urban	5	258		263	532	1	48		49	1,389	49	585	1	44		45	1,562	45
	Rural		1,859		1,859	3,948		47		47	1,332	47	4,474		42		42	11,477	42
	Total	5	2,117		2,122	4,480		47		47	2,721	47	5,059		42		42	13,039	42
San Jose	Urban	8	359		367	579	1	62		63	1,945	63	598	1	60		61	2,107	61
	Rural		1,148		1,148	1,944		59		59	1,822	59	2,161		53		53	6,415	53
	Total	8	1,507		1,515	2,523		60		60	3,767	60	2,759		55		55	8,522	55
San Roque	Urban	10	961		971	1,338	1	72		73	6,116	73	1,476	1	65		66	6,873	66
	Rural		1,456		1,456	1,882		77		77	6,451	77	2,228		65		65	9,628	65
	Total	10	2,417		2,427	3,220		75		75	12,567	75	3,704		65		66	16,501	66
San Vicente	Urban		136		136	341		40		40	644	40	341		40		40	658	40
	Rural		367		367	955		38		38	612	38	984		37		37	1,721	37
	Total		503		503	1,296		39		39	1,256	39	1,325		38		38	2,379	38
Silvino Lobos	Urban		372		372	404		92		92	2,406	92	536		69		69	2,634	69
	Rural		252		252	1,532		16		16	418	16	1,614		16		16	1,680	16
	Total		624		624	1,936		32		32	2,824	32	2,150		29		29	4,314	29
Victoria	Urban	7	221		228	556	1	40		41	1,107	41	556	1	40		41	1,230	41
	Rural		649		649	1,923		34		34	918	34	2,240		29		29	3,501	29
	Total	7	870		877	2,479		35		35	2,025	35	2,796		31		31	4,731	31
Provincial Total	Urban	156	14,521		14,677	24,296		60		60	81,312	60	26,996	1	54		54	88,646	54
	Rural		38,196		38,196	65,370		58		58	77,954	58	71,651		53		53	216,877	53
	Total	156	52,717		52,873	89,666		59		59	159,266	59	98,647		53		54	305,523	54

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

Name of Municipality	Public School Toilets					Public Toilets					
	Std. No. of Student that can be Served by Base Year	Coverage in 1998		Coverage in 2004		Coverage in 1998			Coverage in 2004		
		Total No. of Public School Students	%	Total No. of Public School Student	%	No. of PU with Toilets in Base Year	No. of PU with Sanitary Toilets in Base Year	%	No. of PU with Toilets	No. of PU with Sanitary Toilets in Base Year	%
Allen	560	3,928	14	4,647	12				2		
Biri	680	2,252	30	2,593	26	1	1	100	1	1	100
Bobon	1,840	4,228	44	4,434	41				1		
Capul	1,240	2,870	43	2,805	44	1	1	100	1	1	100
Catarman (Capital)	2,160	13,884	16	17,789	12				2		
Catubig	2,640	5,693	46	6,698	39	3	3	100	2	3	150
Gamay	3,120	6,230	50	6,508	48	3	3	100	1	3	300
Laoang	3,600	9,837	37	11,032	33				1		
Lapinig	400	2,874	14	3,300	12	2			1		
Las Navas	1,440	5,502	26	6,283	23	1			1		
Lavezares	1,400	5,404	26	5,687	25	2	2	100	1	2	200
Lope De Vega	1,080	2,227	48	2,794	39	1	1	100	1	1	100
Mapanas	520	2,548	20	2,963	18				1		
Mondragon	1,200	4,528	27	5,765	21				1		
Palapag	960	6,873	14	8,087	12	1	1	100	1	1	100
Pambujan	2,160	6,243	35	7,006	31	3	3	100	1	3	300
Rosario	2,391	2,391	100	2,927	82						
San Antonio	800	2,200	36	2,108	38				1		
San Isidro	2,800	5,635	50	6,539	43				3		
San Jose	1,840	3,132	59	3,623	51	1	1	100	1	1	100
San Roque	1,480	3,652	41	4,481	33				1		
San Vicente	1,360	1,450	94	1,530	89						
Silvino Lobos	680	1,647	41	1,994	34	1	1	100		1	
Victoria	720	3,337	22	3,540	20	1	1	100	1	1	100
Provincial Total	37,071	108,565	34	125,133	30	21	18	86	26	18	69