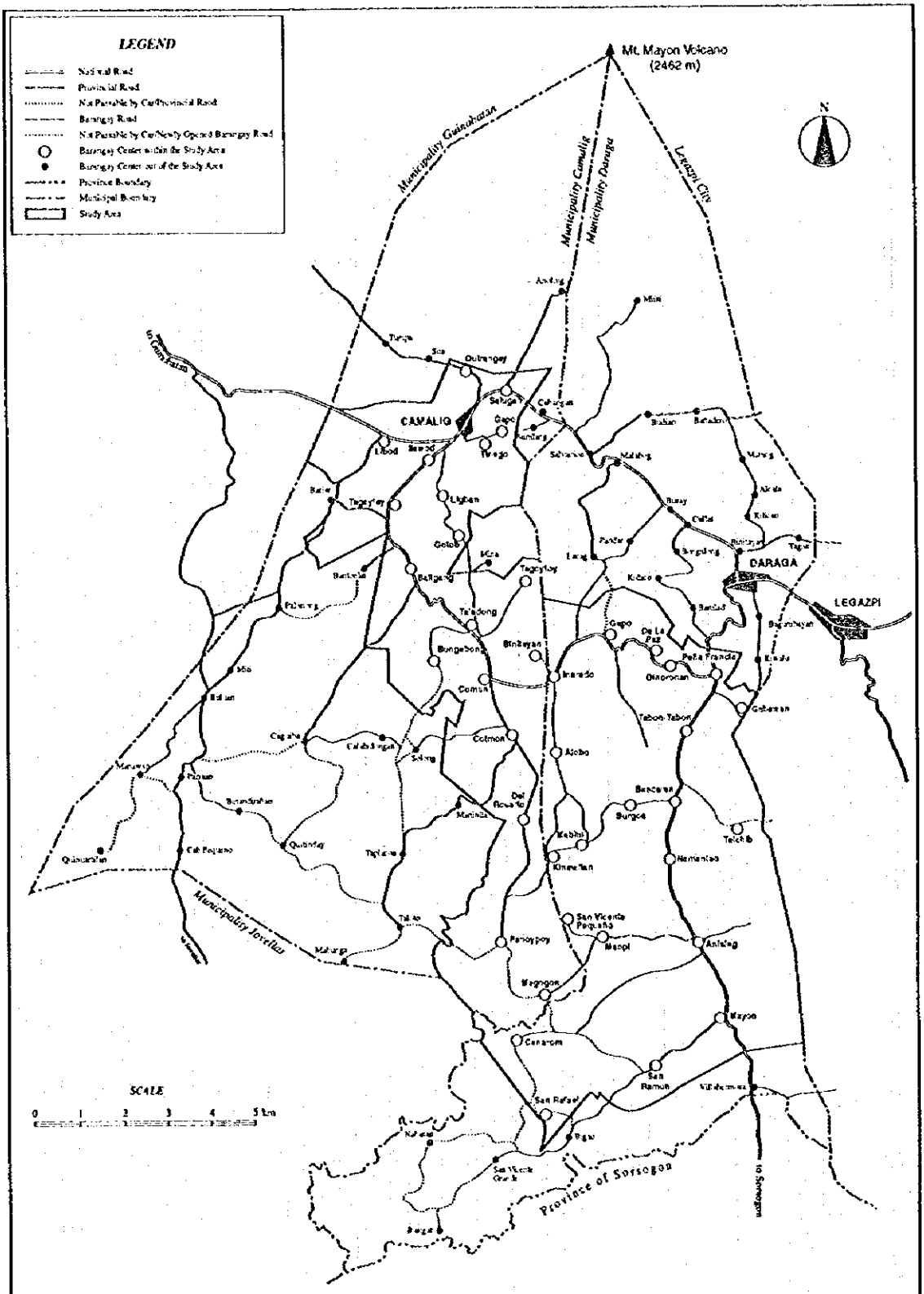
THE FEASIBILITY STUDY ON
THE WESTERN LEGAZPI IRRIGATION AND
RURAL DEVELOPMENT PROJECT IN THE PHILIPPINES

FIGURES



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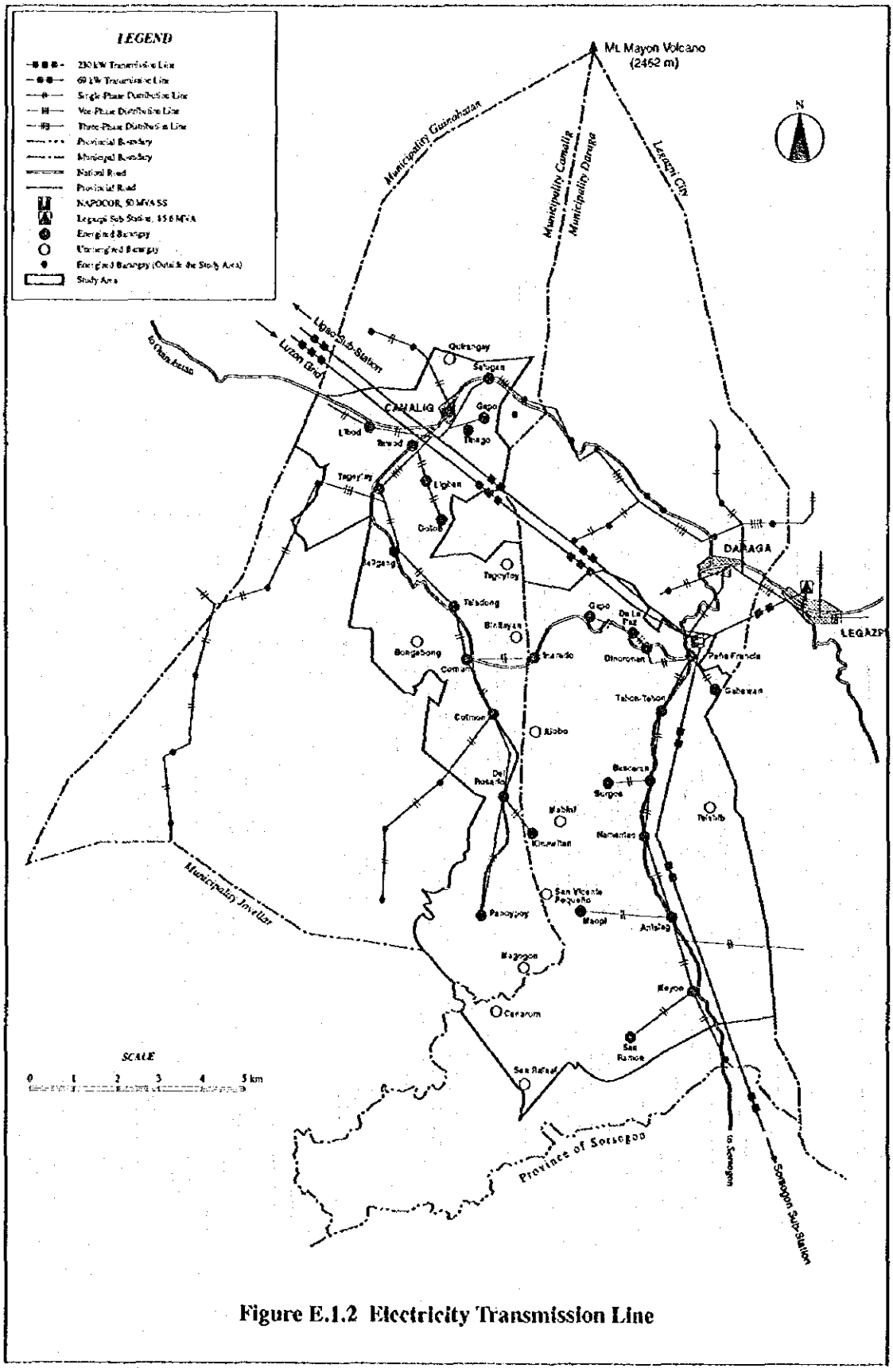

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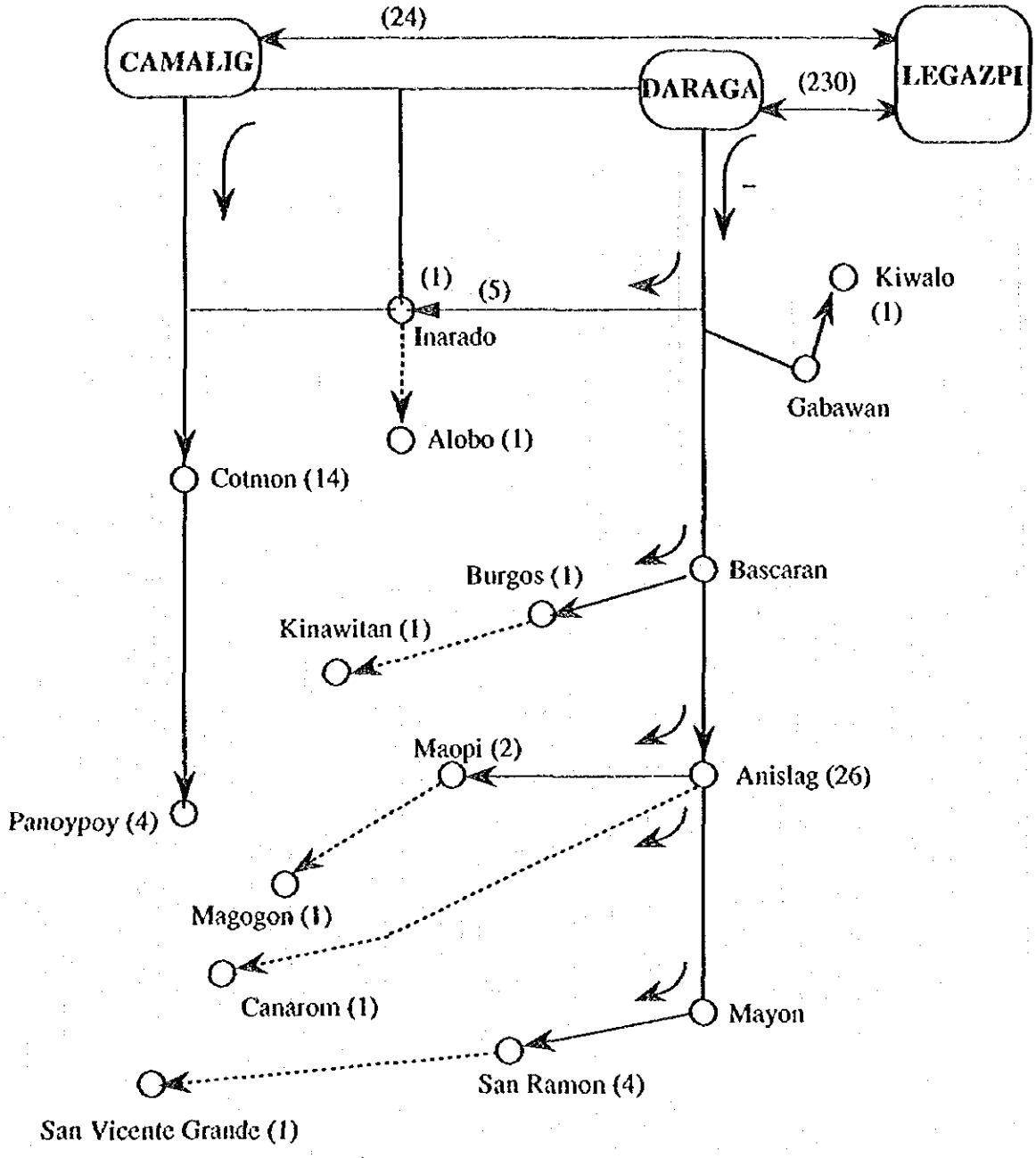

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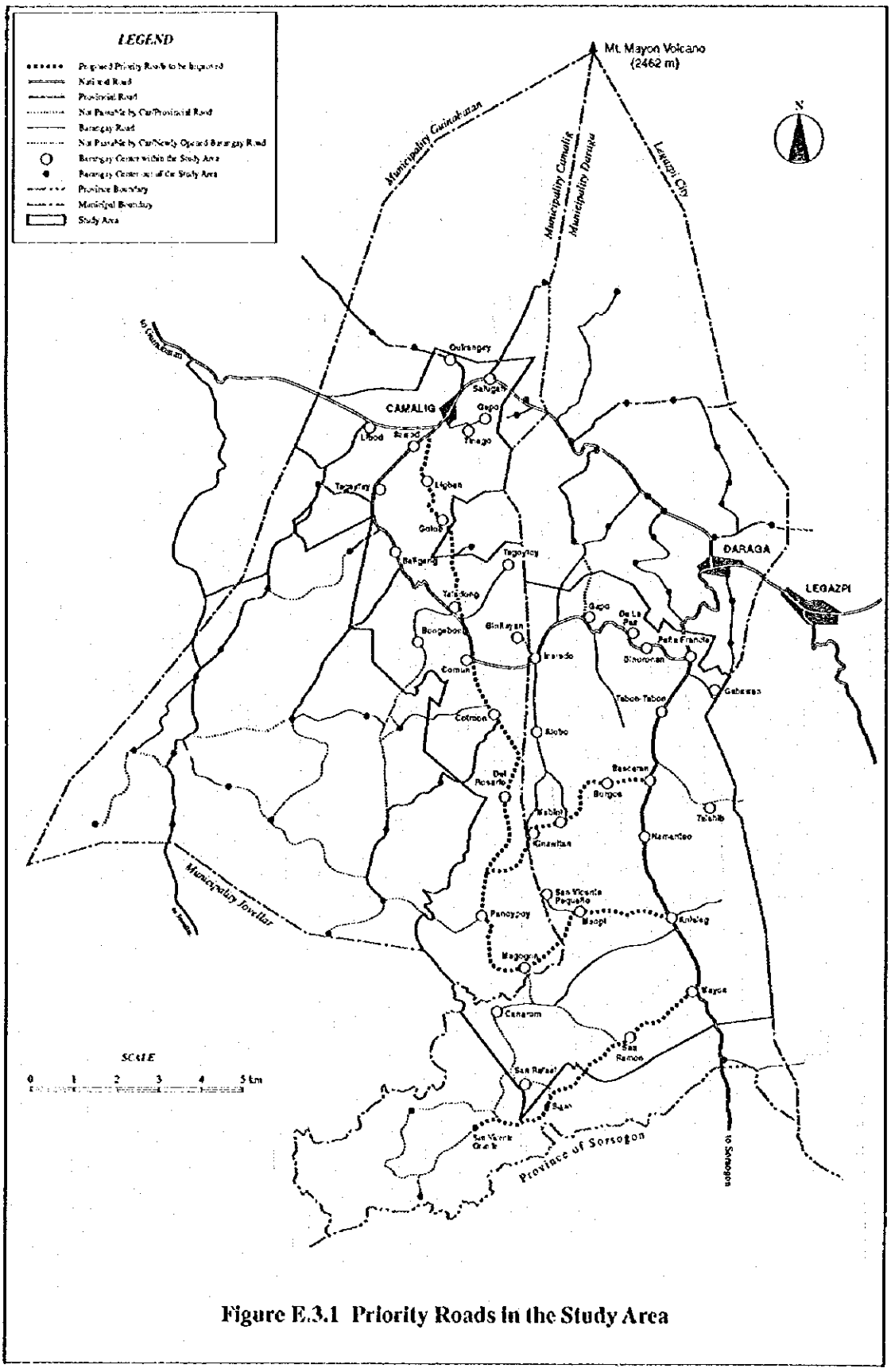

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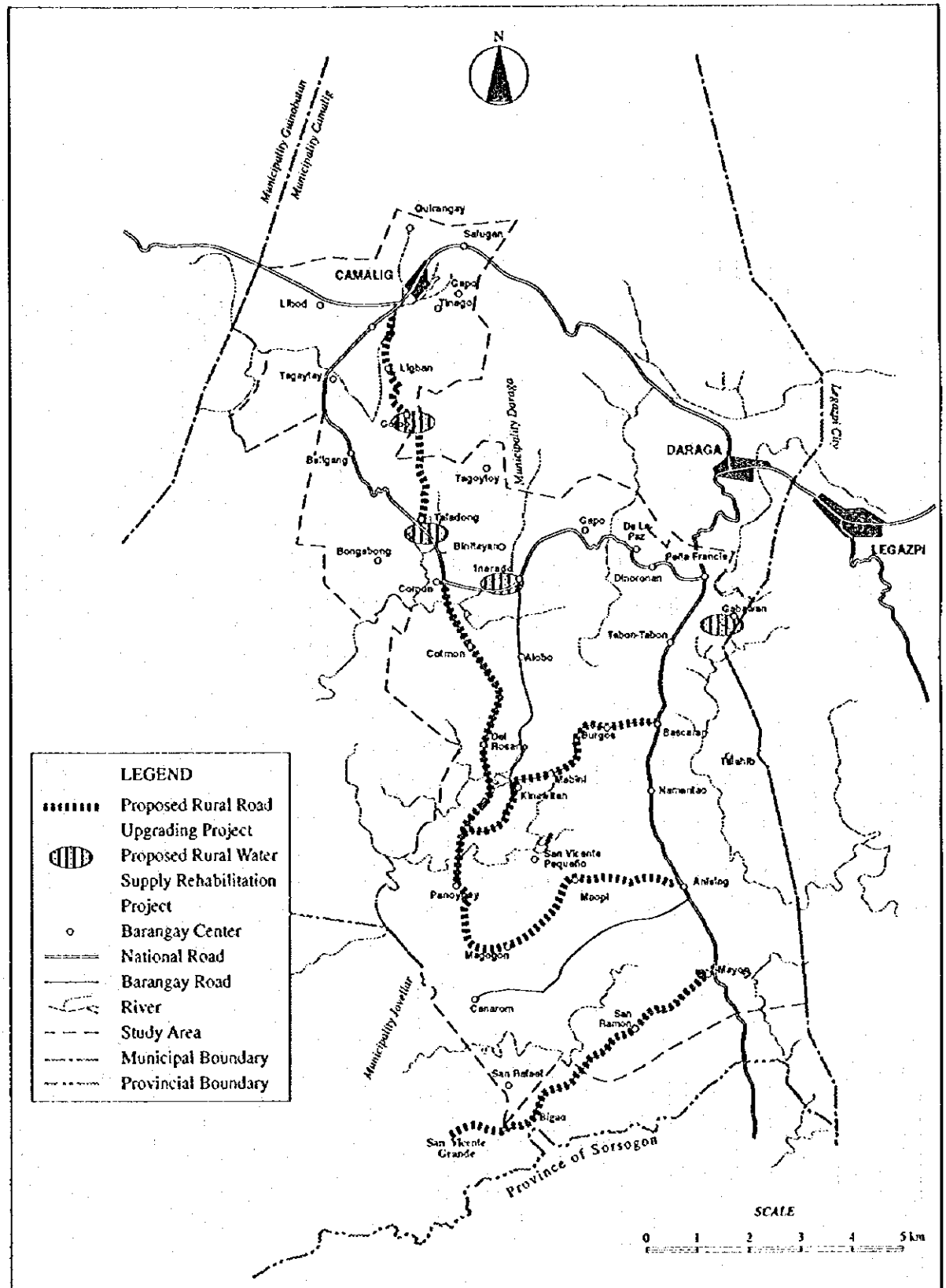

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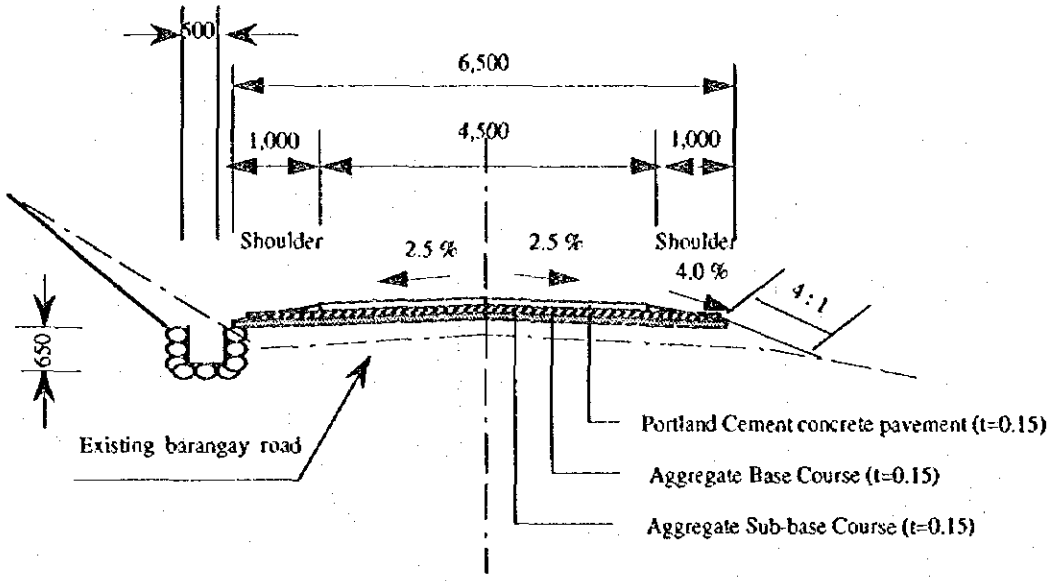

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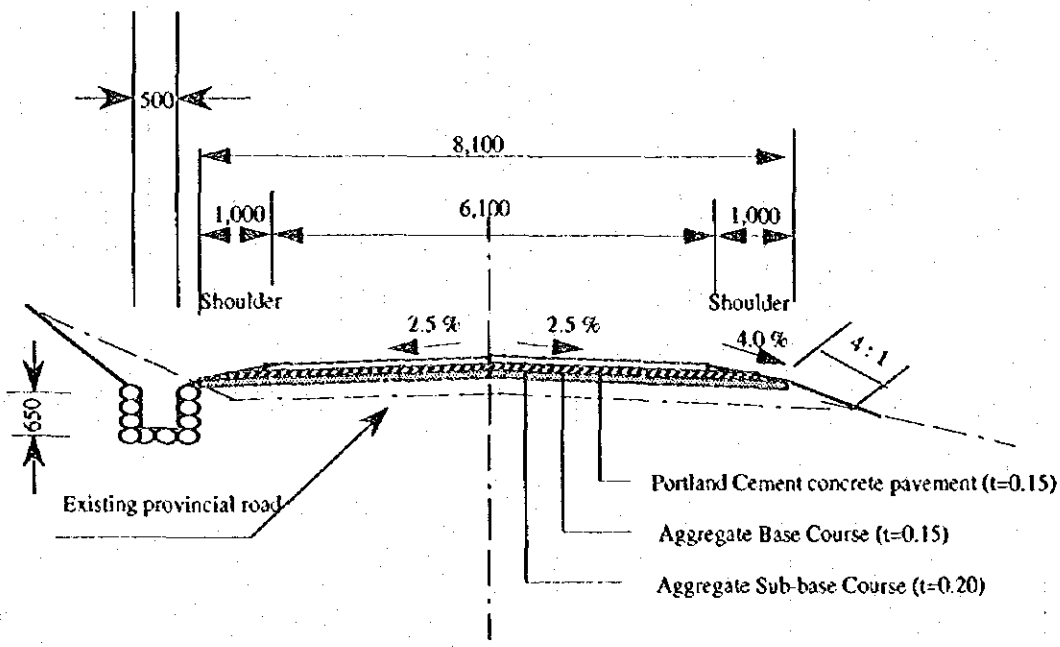

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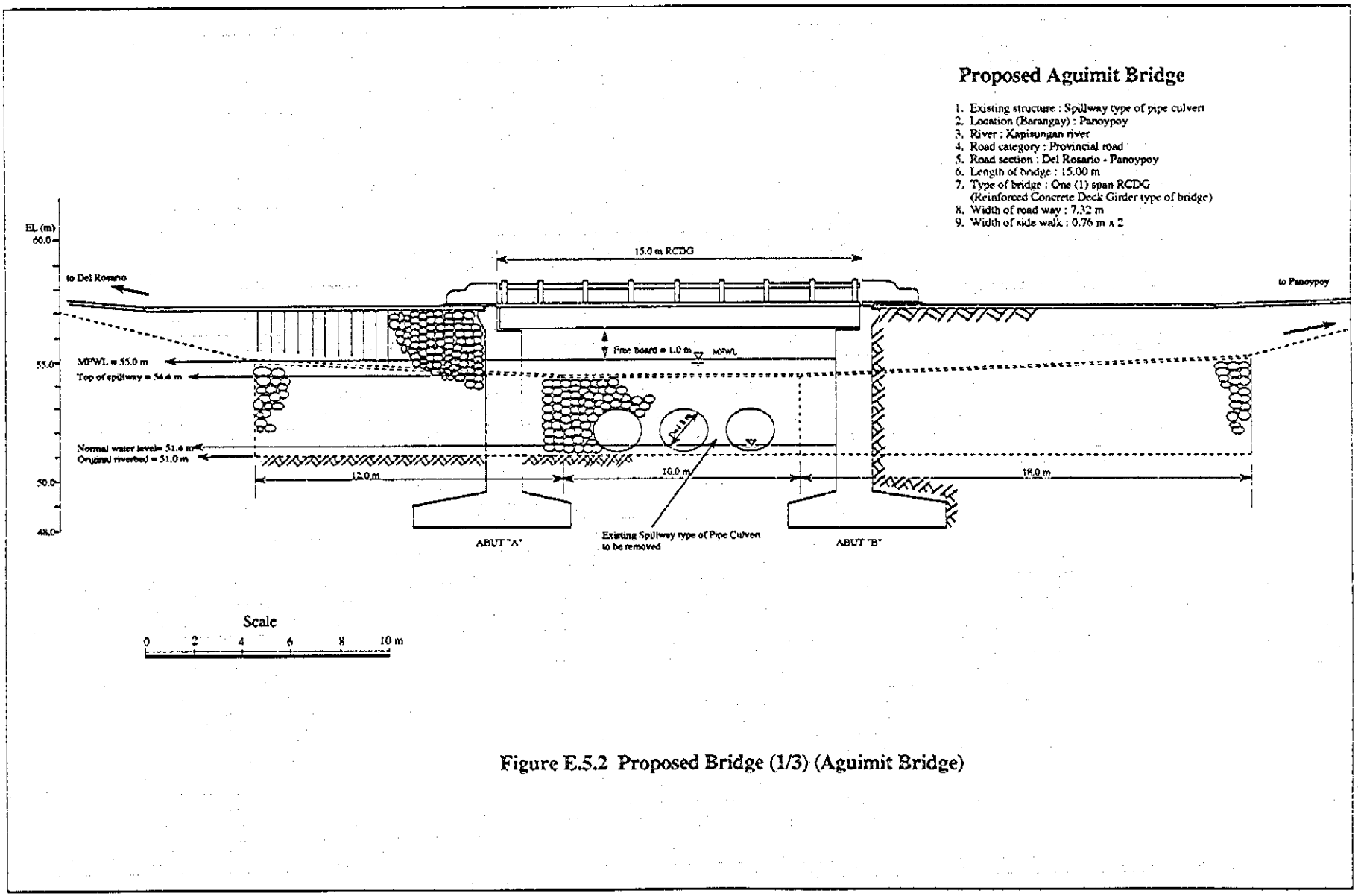

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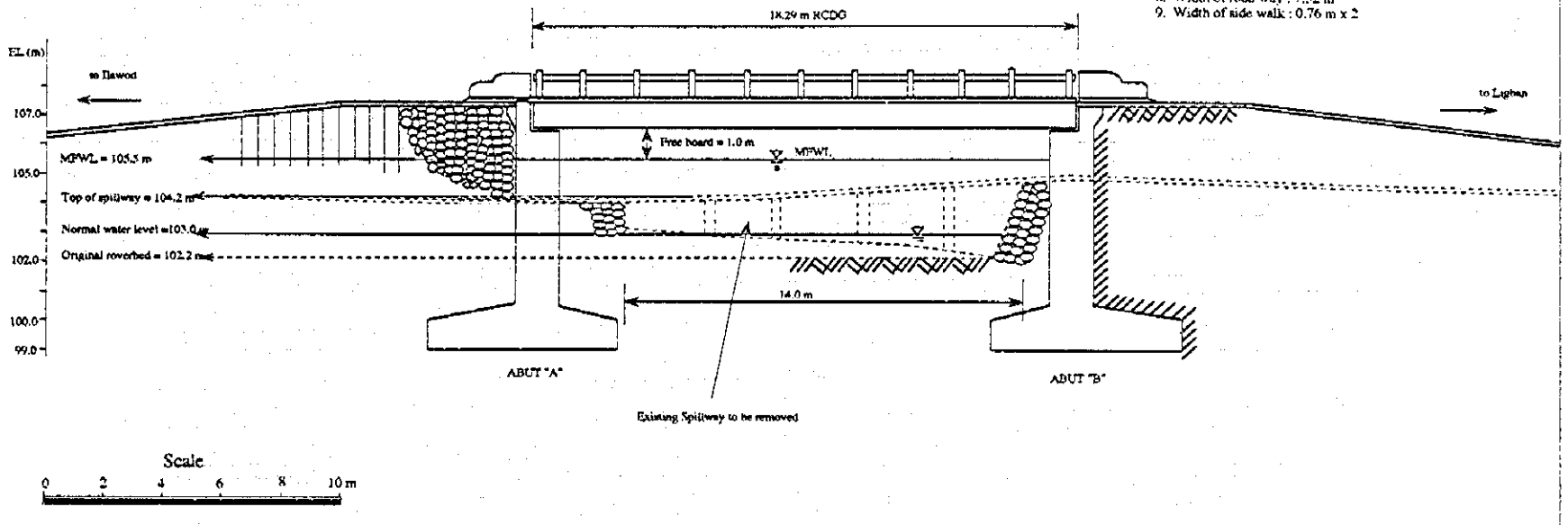

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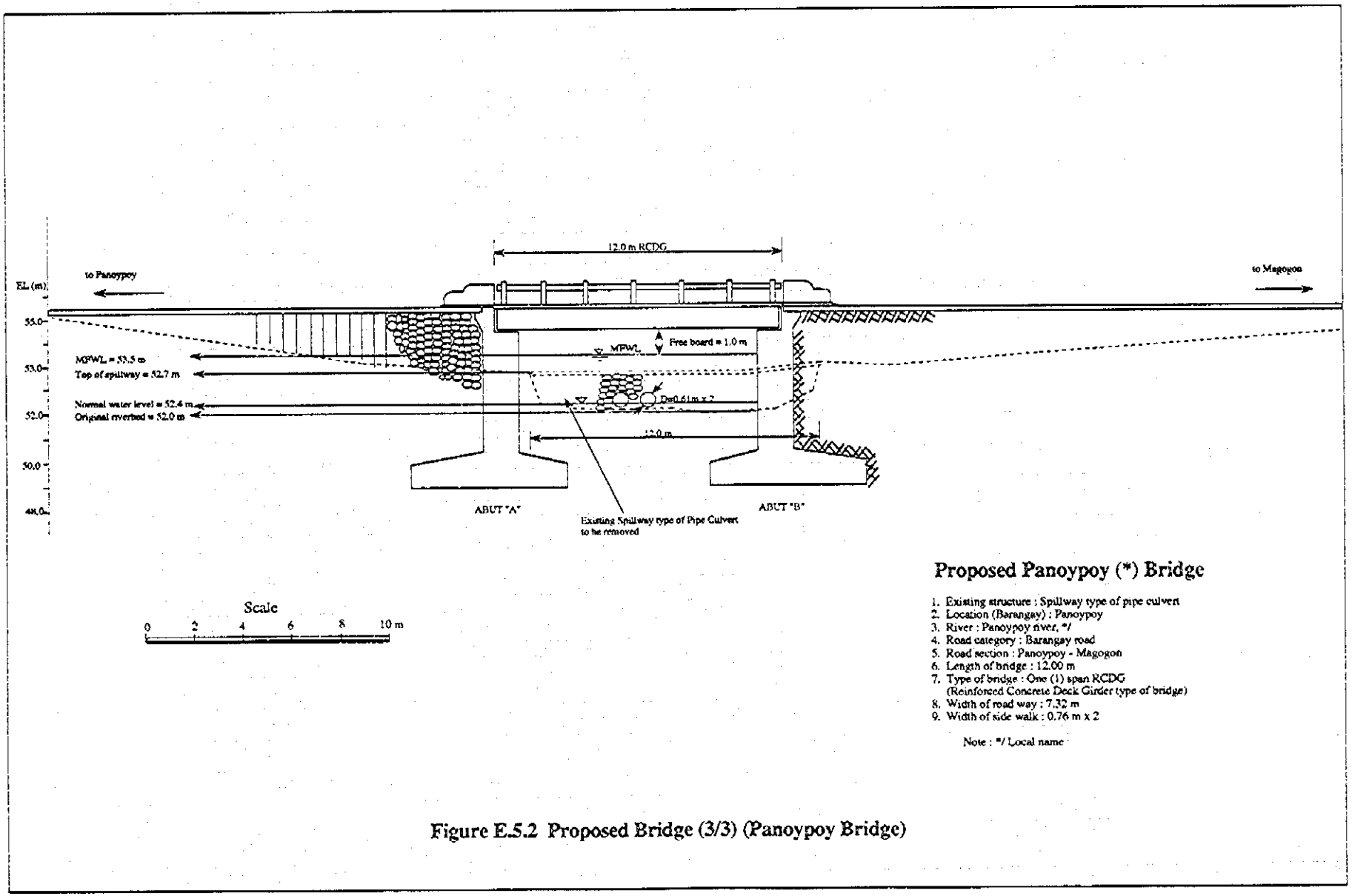

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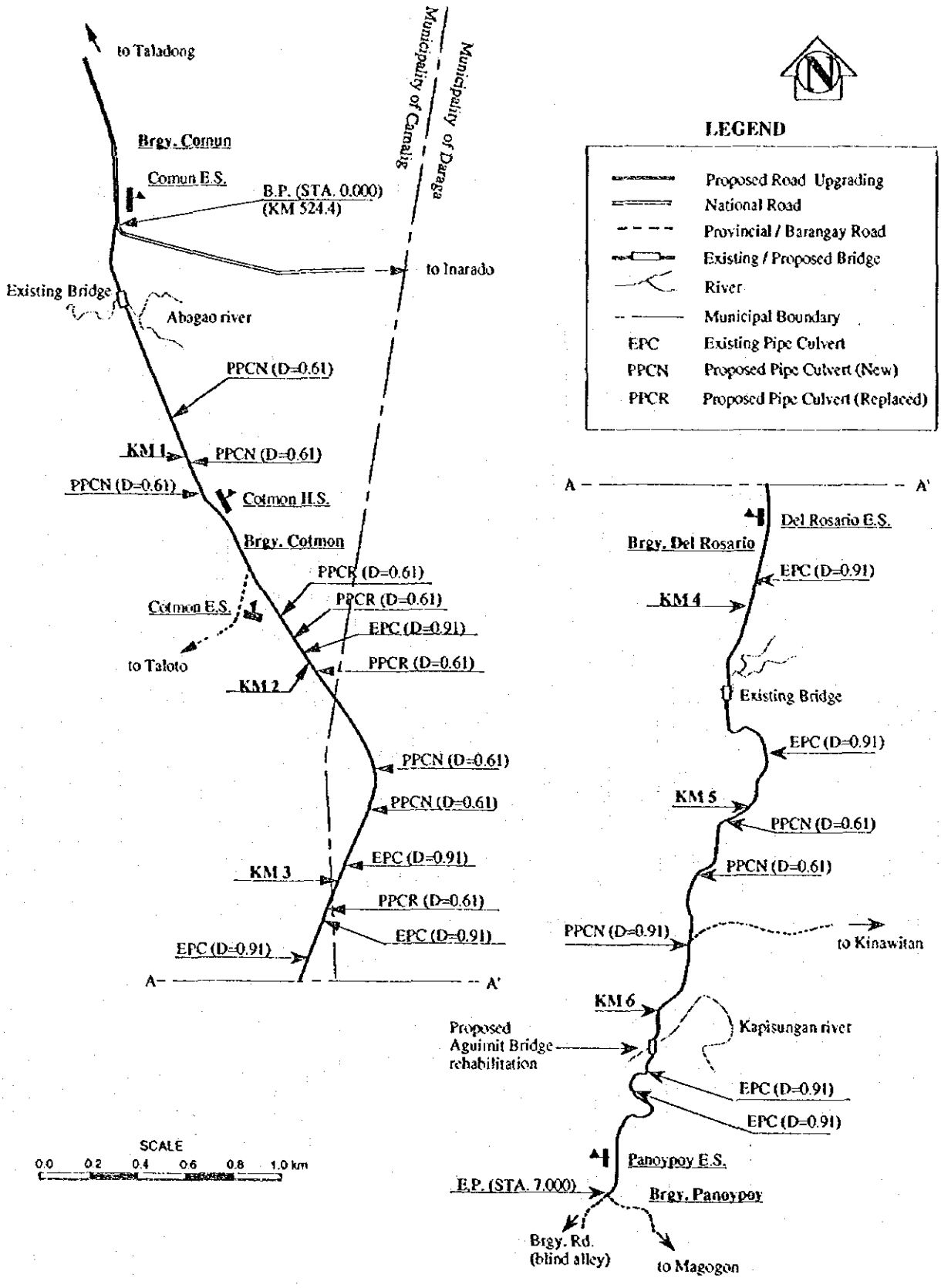

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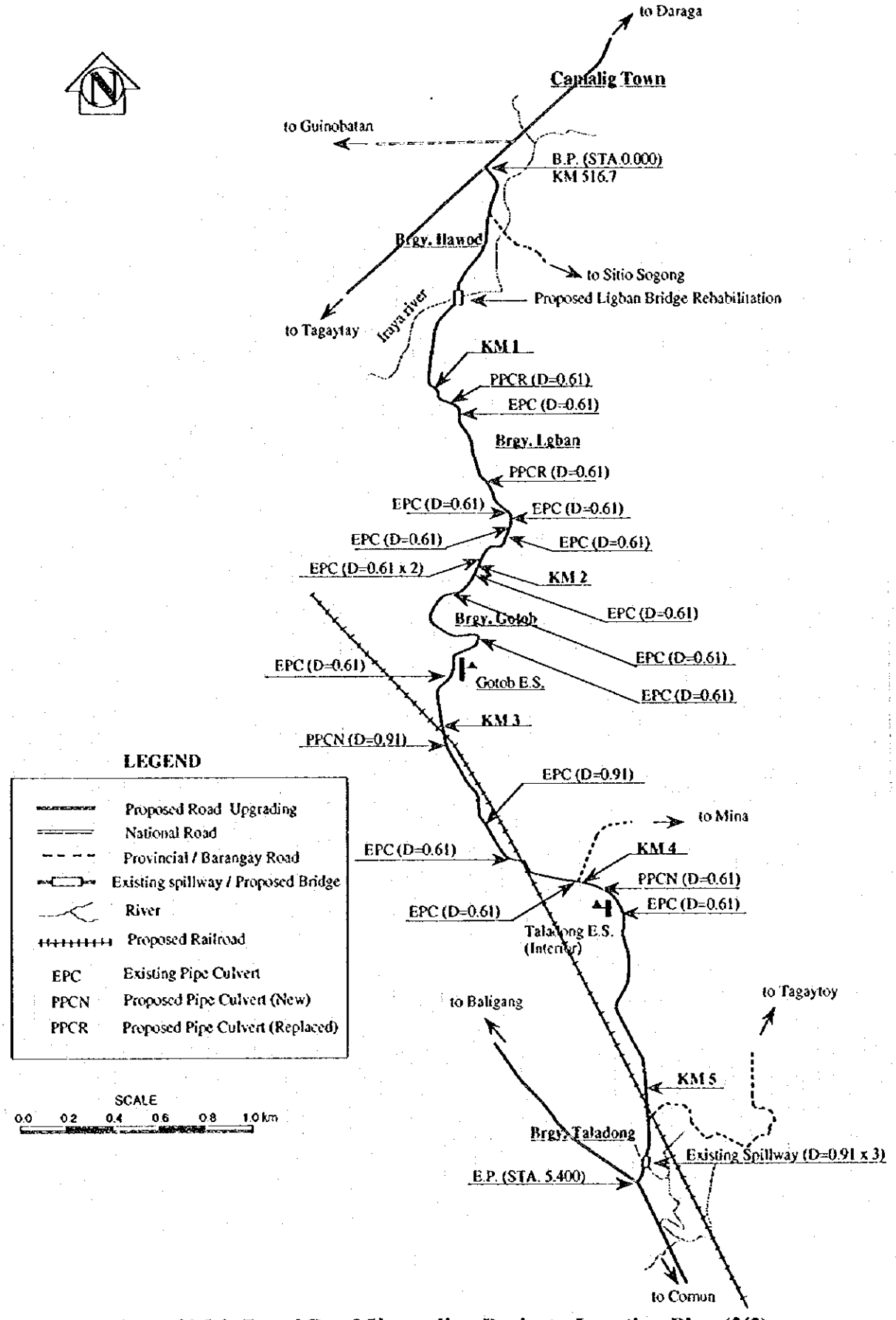

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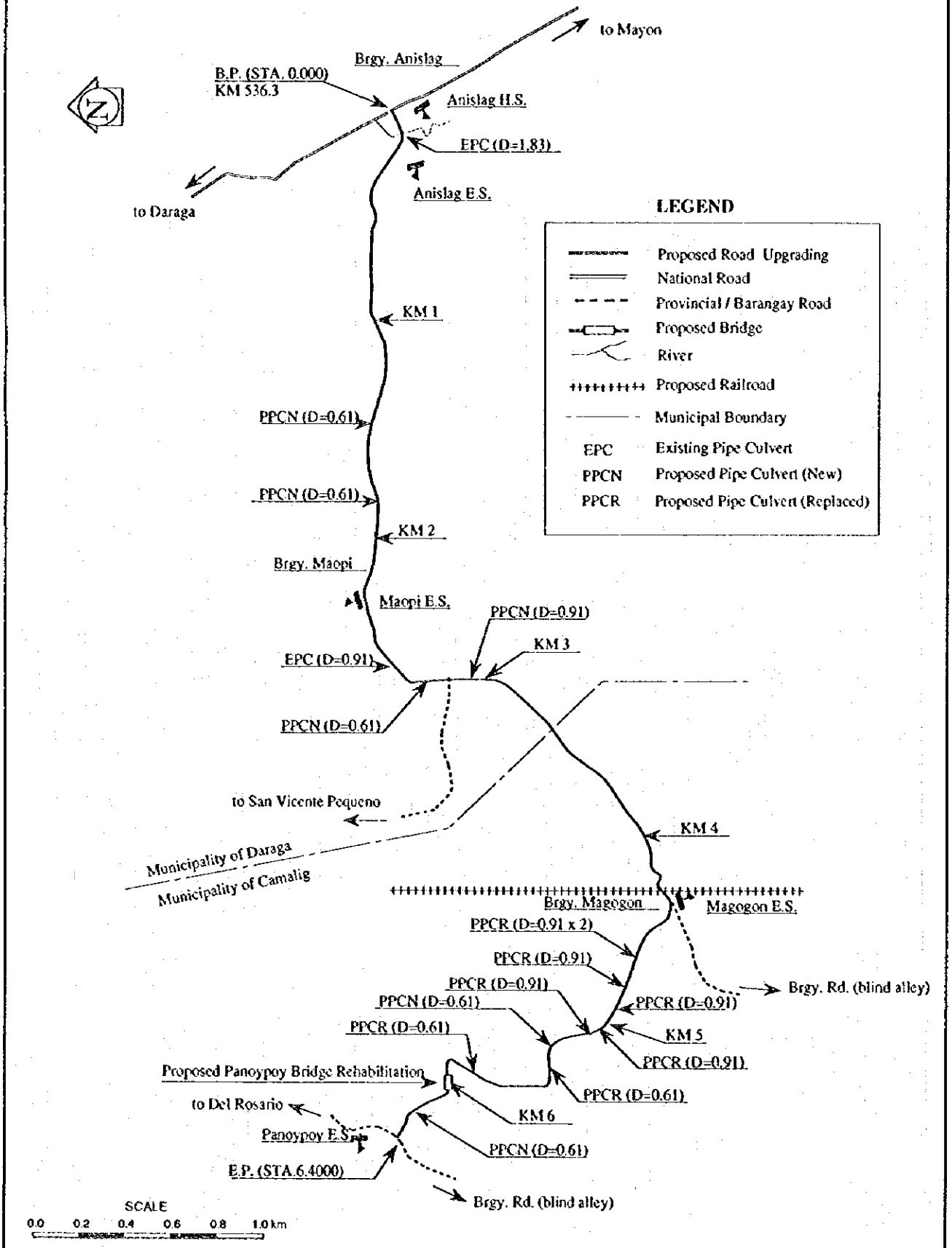

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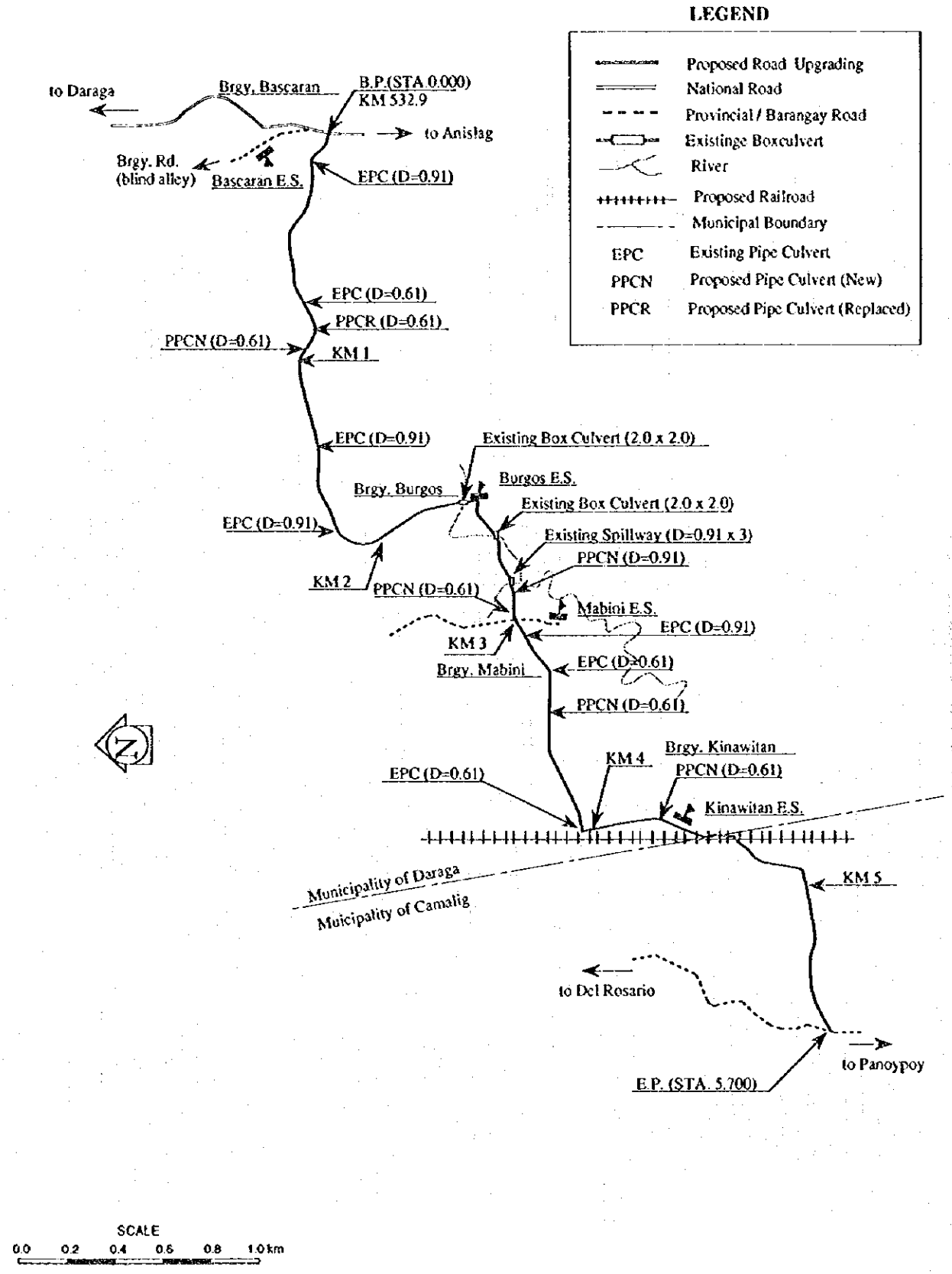

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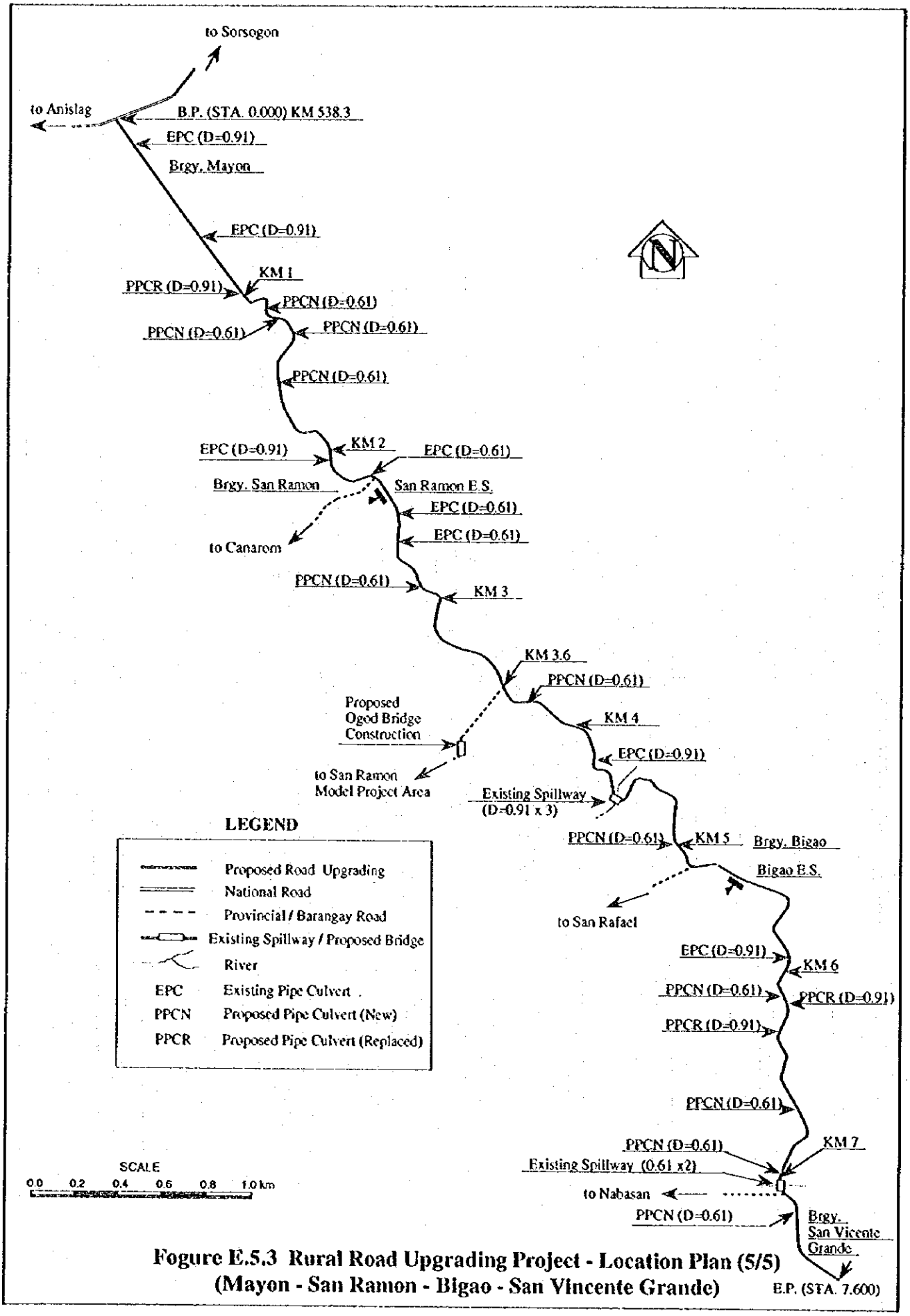

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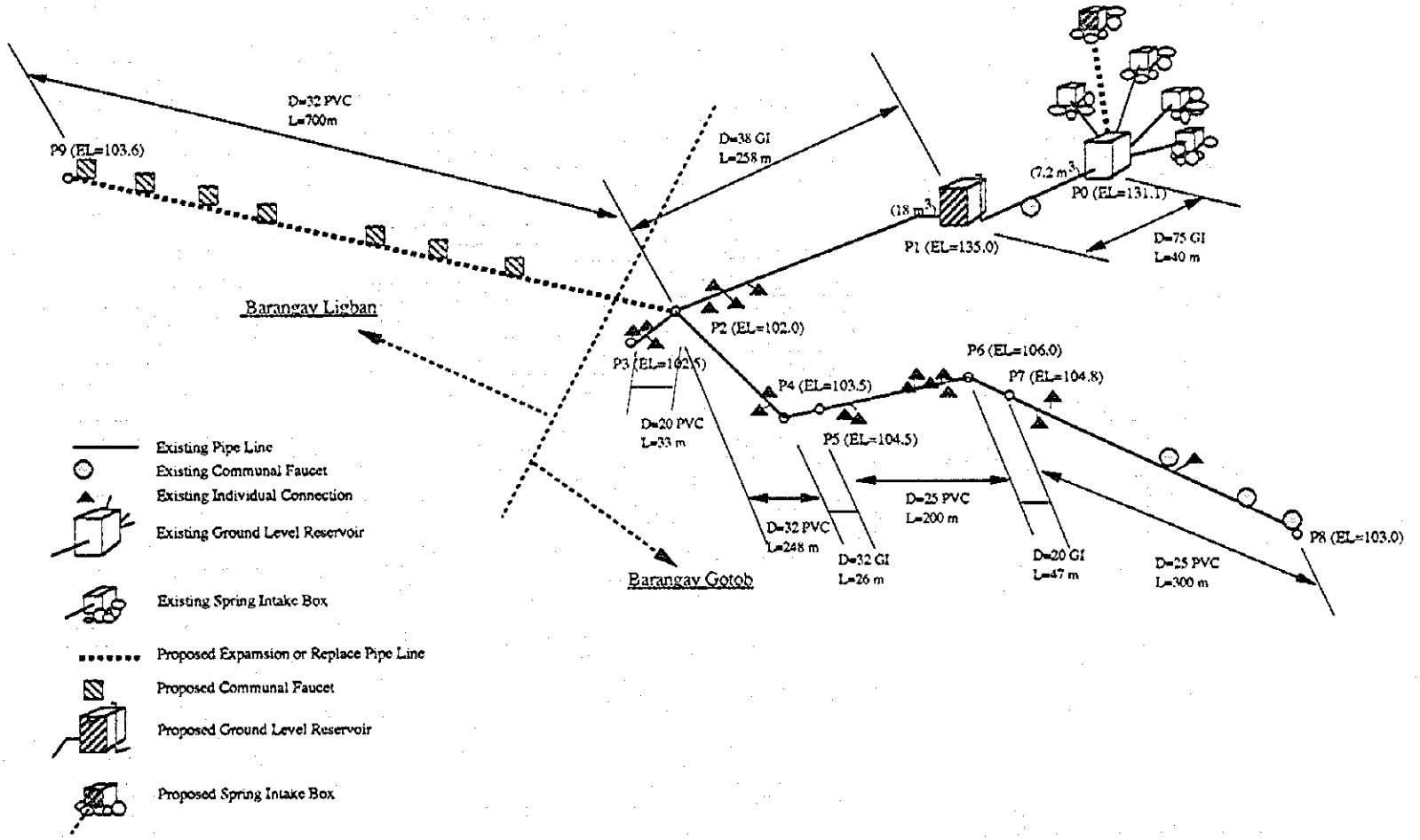

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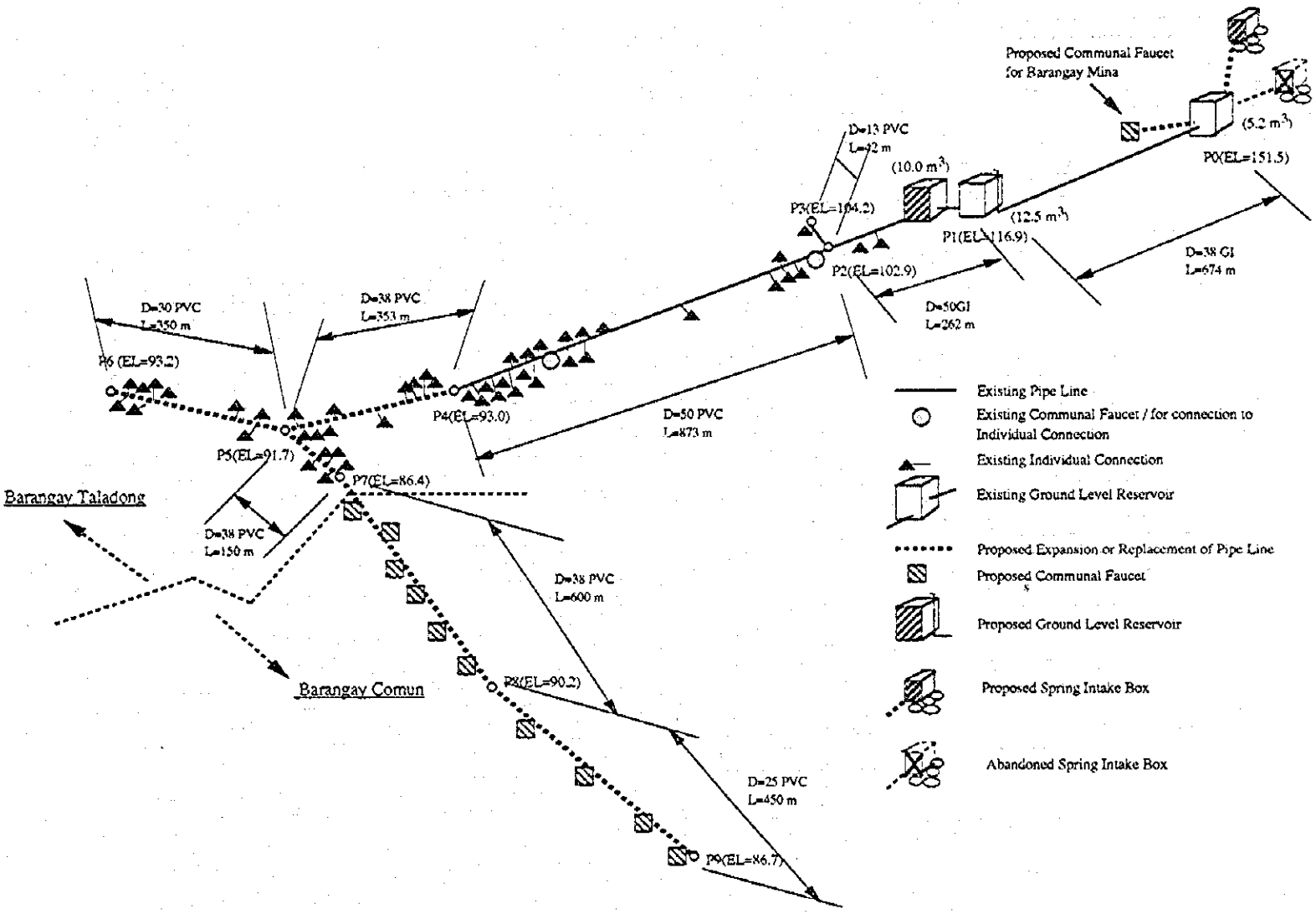

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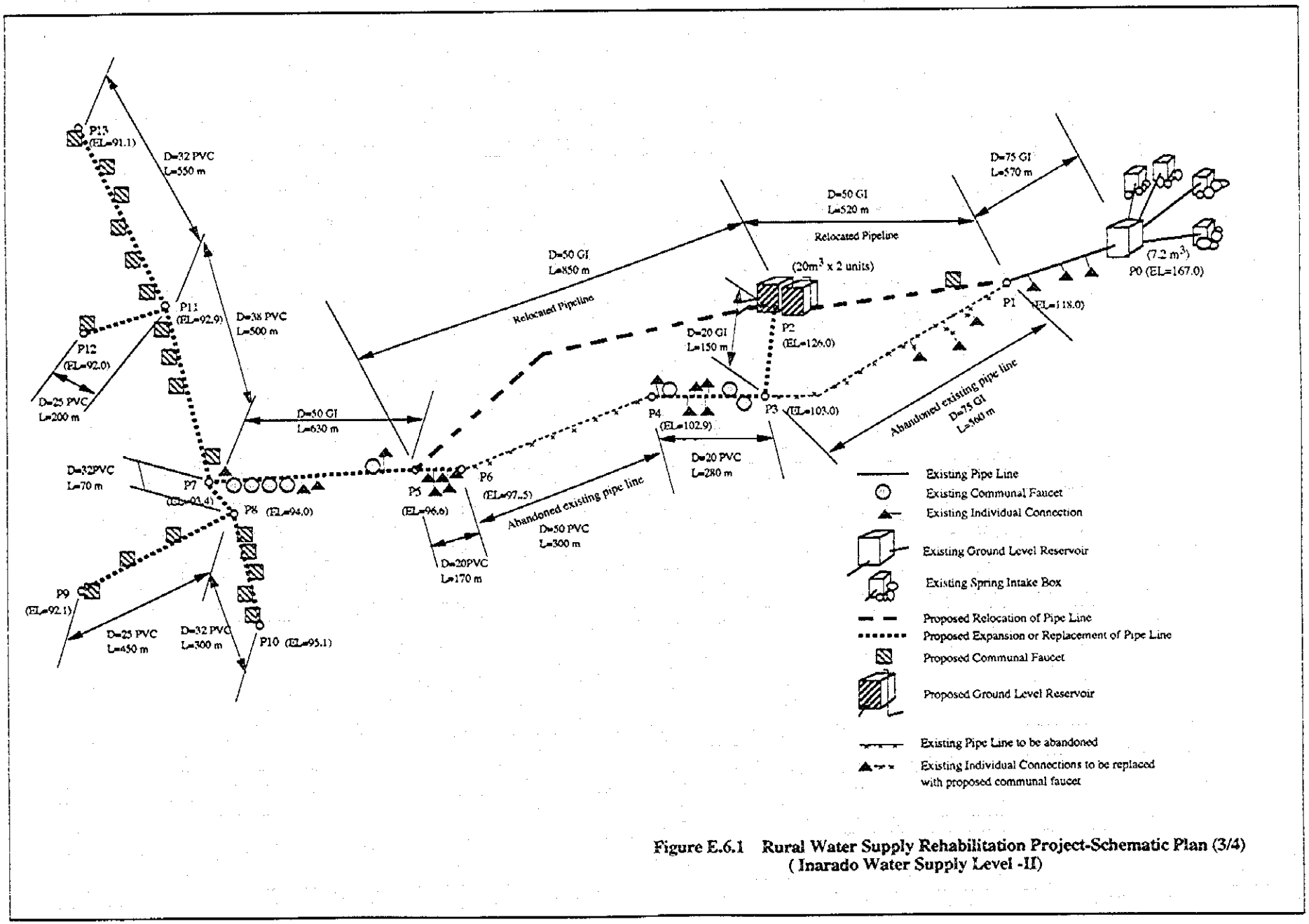

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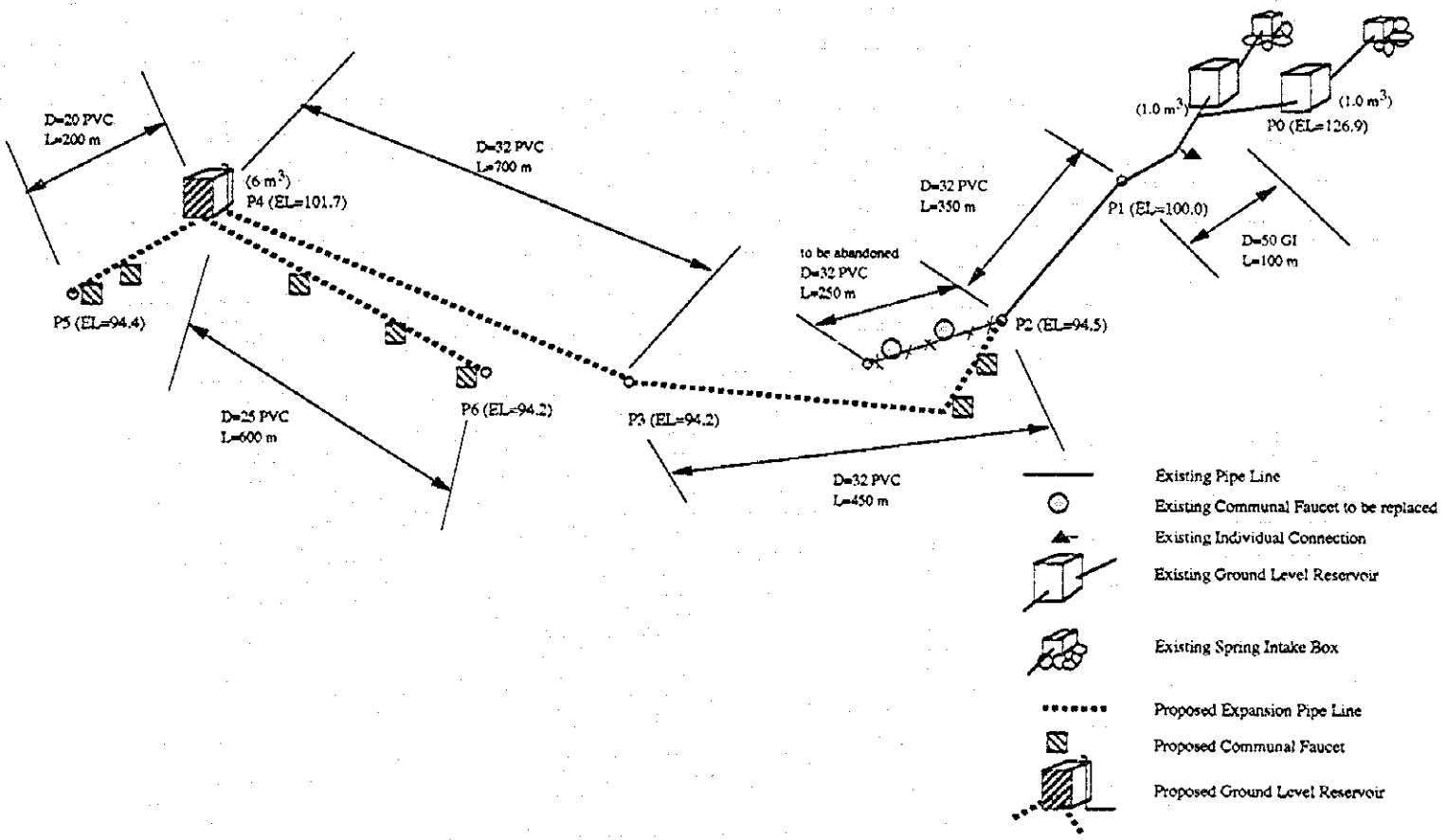

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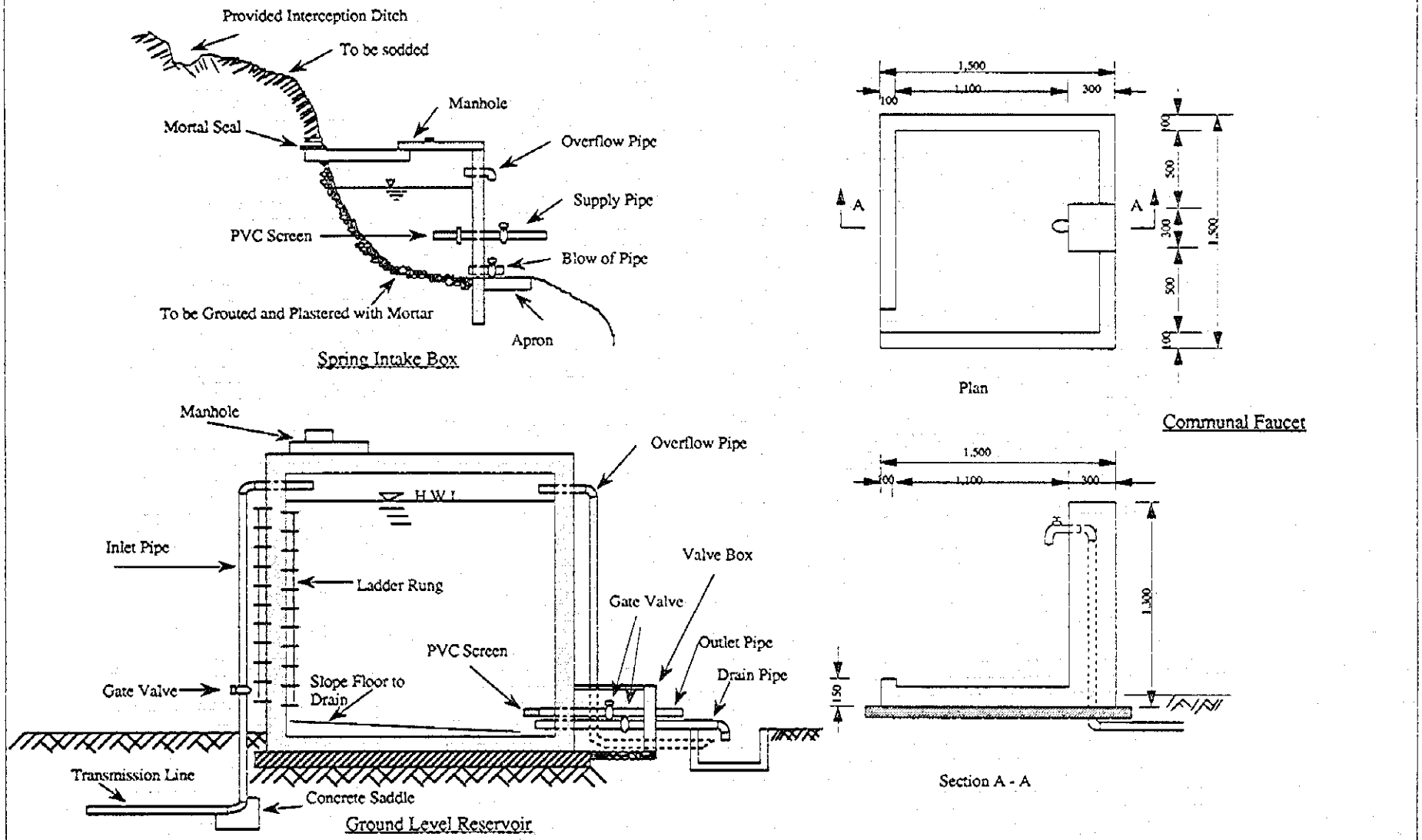

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ANNEX F

AGRICULTURE AND AGRICULTURAL ECONOMY

ANNEX F

AGRICULTURE AND AGRICULTURAL ECONOMY

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1. INTRODUCTION

The agricultural sector still remains a major pillar of the Philippine economy. It accounts for about 23% of the Gross Domestic Product (GDP), more than 21% of export earnings and about 50% of total employment. About 55% of the population lives in rural areas and depends, either directly or indirectly, on agriculture for the main source of livelihood. However, the majority of rural residents, especially the small farmers, remain under the poverty line. The rural areas have a higher incidence (53%) of poverty compared with a 32% of the urban areas. The rural-urban inequality has worsened over the time as the ratio of average rural family income to average urban family income declined from 0.67 in 1975 to 0.46 in 1985. In recent years, more than 80% of the farm families are classified in the lower 30% income bracket.

In view of the above conditions, the Philippine Agricultural Development Plan (1991-1995) has been designed to increase the agricultural Gross Value Added (GVA) at an average rate of 4.27% per year in real terms through the following major strategies:

1) Institutionalization of small farmers' participation in policy making, planning, implementation, monitoring and evaluation of government programs;

2) Increase in government investments in basic infrastructure, especially irrigation and drainage, farm-to-market roads, farm mechanization, power, and communication infrastructure;

3) Enhancement of research and extension works to improve the agricultural production;

4) Reduction of government interventions in the production, marketing, and processing of agricultural inputs and outputs;

5) Improvement of rural credit systems; and

6) Reforms in marketing and transportation of agricultural products.

In consonance with the targets and strategies adopted in the Medium-Terms Philippine Development Plan (MTPDP, 1993-1998), the Department of Agriculture (DA) has now put great emphasis on the increase of productivity and real income of small farmers, especially in poverty-stricken areas.

The Region V so-called Bicol Region, including Albay Province, which is agriculture based and categorized as the second poorest region in the Philippines in terms of family income. The proportion of families below the poverty level in the Region is the highest in the country. Therefore, the overall development strategies of the Region have been geared to increase rural employment opportunities and family income primarily from the agricultural sector.

Against such background, the Government of Philippines (GOP) requested the Government of Japan (GOJ) in September 1994 to carry out the Feasibility Study on the Western Legazpi Irrigation and Rural Development Project in Albay Province. In response to the request, GOJ dispatched a preliminary survey team through JICA and the Implementing Agreement for the Study (I/A) was signed between NIA and JICA in March 1995.

Annex-F " Agriculture and Agricultural Economy" comprises 1) Socio-economic background of the Study, 2) Present condition of the Study area, 3) Basic agricultural development plan of the Study area, 4) Present condition of model rural development project areas, 5) Constraints and development strategies for model rural development, 6) Lowland and upland model rural development projects covering agricultural production plan, post-harvest and marketing plan, and 7) Crop budget and financial benefit through the model projects.

2. SOCIO-ECONOMIC BACKGROUND

2.1 National and Regional Economy

2.1.1 Facts on the Philippines

The Philippines has about 7,107 islands spread out over a total land mass of roughly 300,000 square kilometers. The country's islands are grouped into 15 regions which are further divided into 76 provinces, 64 cities, 1,532 municipalities and 41, 153 barangays. These groupings represent the hierarchical structure of the LGUs. The Study area belongs to Region V and the province is located in Albay. The covered municipalities are Camalig and Daraga.

Total population of the country as of 1995 is placed at 70.3 million or an equivalent population density of 234 persons/km^2. The current labor force is 27.5 million persons with a labor force participation rate of 64%. Alienable and disposable land currently stands at 14.1 million ha, while forest land measures at 15.9 million ha. Total length of road network is about 161,000 km, 83% of which are local roads.

2.1.2 The Philippine Economy, 1990-94

Real economic growth expanded by an average of 2.4% during 1990 and 1994. Per capita GNP in real terms stood at $482 in 1994, a slight decline from the $483 posted in 1990 mainly due to the depreciation of the peso vis-a-vis the U.S. dollar. During the same period, inflation averaged at 11.7% annually, although single digit inflation rates were recorded beginning 1992 until 1994. There was indeed a remarkable improvement made by the government in containing price increases when it brought down inflation from 14.2% in 1990 to 9.0% in 1994. The unemployment rate averaged at 8.6% annually, while the population growth rate has been estimated to be growing at 2.6% annually. The high population growth rate exerted tremendous pressure on the economy relative to the provision of basic services to a growing population, considered as among the highest in Asia.

The period under review can be classified into two dimensions. First, the beginning of the 90s brought disasters of megascale that have devastated several regions of the country. These included several earthquakes and more importantly the eruption of Mt. Pinatubo which have significantly damaged the land resources of Region III (Central Luzon). These calamities constricted tremendously the growth of the economy as evidenced by the sudden decline of GDP in 1991. The agriculture sector suffered the greatest setback among the sectors. The real growth of the GVA for agriculture grew by a measly 1.4% between 1990 and 1991 and slightly increased to 0.4% between 1991 and 1992. Over the last 5 years, the real growth of the sector stood at 1.6% annually.

Second, the middle of 1992 began the term of the Ramos Administration which instituted several policy reforms based on privatization, liberalization and deregulation. Towards the end of 1992, the economy started to accelerate its momentum and by the end of 1994, real GNP growth was posted at 5.2% and inflation was maintained at a single digit. For the first time in the 90s, real GNP growth rate outpaced the population growth rate. The incidence of poverty among families also declined, from 39.9% in 1991 to 35.7% in 1994. In terms of population, there was also a corresponding reduction from 45.3% in 1991 to 41.3% in 1992.

Indicators	1990	1991	1992	1993	1994	Growth 1990-94(%)
GNP at constant 1985 prices(million pesos)	724	726	737	756	795	2.4
GDP at constant 1985 prices(million pesos)	721	717	719	734	766	1.5
Per capita GNP($)	483	418	445	452	482	-0.1
Inflation Rate(%)	14.2	18.7	8.9	7.6	9.0	11.7*
Unemployment Rate(%)	8.1	9.0	8.6	8.9	8.4	8.6*
Gross savings as ratio to GNP(%)	18.6	18.3	19.0	18.0	20.0	19.0*
Population(million)	62.0	63.7	65.3	66.9	68.6	2.6

Source: 1995 Philippine Statistical Yearbook (Ref. Table F.2.1)
* Average

Sustainable development culminated the overriding goal of the Ramos Administration. A demand-led, employment-oriented and rural-based strategy" was vigorously implemented to sustain the momentum of growth being achieved. This situates very well the context of WLIRDP relative to complementing the rural-based strategy of the government to propel economic prosperity in the rural areas.

Prospect are bright for the economy to sustain the growth it posted in 1994 towards the end of the decade. Government policies continue to aim at price stability via a continuing deficit reduction program. A progressive tax reform program aimed at lower marginal tax rates applied to a larger base is being pursued. Moreover, the import liberalization and the tariff reduction program will enable domestic enterprises to be globally competitive.

2.1.3 The Economy of Region V

Some selected economic indicators about the economy of Region V is discussed as follows. The real GRDP increased from 21.7 million pesos in 1990 to about 23.35 million pesos in 1994 or an average annual growth of roughly 1.9%. Agriculture and services contribute about 40% each to the GRDP and the balance to industry. However, the share of agriculture has been declining, and industry and services were increasing, an indication of the transformation from agriculture-based to industrial economy.

Total population of Region V also significantly increased from 3.9 million in 1990 to about 4.4 million in 1994. The population growth rate in 1990-94 was posted at 2.4%, one of the lowest among the 15 regions and even lower than the national average of 2.6%. The labor force in 1994 was about 2 million people with a labor force participation rate of 70% which was relatively impressive by regional standards. However, the employment rate between 1990 and 1994 was slightly decreasing, and thus the unemployment rate increased from 3.50% in 1990 to 4.34% in 1994. In terms of poverty among the 15 regions, Region V registered the highest incidence of poverty at 54.2% in 1994. This was equivalent to about 461,000 families deprived of basic economic services. In terms of population, however, the incidence of poverty is placed at 60.4% of the total population. The annual per capita poverty threshold was estimated at 8,421 pesos. In view of this situation, Region V has been a priority area for rural development projects (Ref. Table F.2.2)

2.2 Agriculture and Rural Development Policies

2.2.1 Philippines 2000 and the Medium-Term Philippine Development Plan

The Ramos Administration defined a vision of development that is called Philippines 2000. This vision envisages the country by the year 2000 as "having properly addressed its internal problems and being fully capable of handling and benefiting from its international relations". It projects an image that by the year 2000, the Filipinos have "adequate food, clothing, shelter, and dignity".

The structural framework of Philippines 2000 is the MTPDP. The MTPDP sets the broad developmental directions of the country between 1993 and 1998. It essentially hinges on two fundamental strategies, namely: people empowerment and global competitiveness. People empowerment stresses direct and combined efforts of people initiatives to solve the chronic problem of poverty. It seeks to make every Filipino to attain his minimum basic needs, notably survival, security and awareness to actively participate in community activities. Global competitiveness, on the other hand, emphasizes greater leverage for domestic producers, particularly small farmers to produce for the world market or compete against imports in the domestic market.

Congruent with the Philippines 2000 and MTPDP is a package of intervention and strategies aimed at uplifting the most disadvantaged sectors in Philippine society. This is the so-called Social Reform Agenda(SRA). The SRA highlights economic development through advancement of social equity in terms of asset reforms; just sharing of the benefits of growth; and peoples participation in the political and economic milieu.

For the above-mentioned strategies to proceed successfully, the MTPDP espouses policies that are congruent and consistent with sound economic principles. These principles are decentralization or devolution; reliance on non-government initiative and democratic consultation; full cost recovery; social equity; and macro-economic stability.

The planned strategies of WLIRDP fits very well within the ambit of MTPDP. For one, it emphasizes participatory approach among the various stakeholders relative to the formulation of the project components. Second, it envisages the development of lowland and uplands taking into consideration the human, institutional, natural resource use and ecosystem, and physical infrastructure factors.

(Unit: %)

Indicators	1994	1998
Poverty incidence among families	39.2*	30
Unemployment rate	9.1	6.6
Real GNP growth rate	3.5-4.5	8.5-10.0
Real GDP growth rate	3.4-4.4	8.1- 9.8
Inflation rate	9.0-10.0	4.0
Investment proportion to GNP	24.5	29.5
Domestic Savings ratio to GNP	19.8	27.8
Population growth rate	2.36	<2.0

Source: Medium-Term Philippine Development Plan, 1993-1998
* Base year is 1991.

2.2.2 Sustainable Agri-Industrial Development

The MTPDP subsumed a common framework between agriculture and industry to stress the links between these two sectors. Under this framework, a productive agriculture sector composed of viable farm enterprises of strong production and marketing linkages with industry

is envisaged as the core of rural development. The linkage is also aimed to create a strong and competitive manufacturing sector utilizing mainly local raw materials and providing employment to majority of the population. This shift in policy virtually eliminates the traditional system of developing agriculture independent of the industry sector.

There are three major policies and strategies of this development relevant to WLIRDP. First is the implementation of appropriate macro and sectoral policies. Under the agriculture sector, increased government investments in irrigation, farm-to-market roads and post-harvest facilities, including research and extension is given emphasis. Second is the adoption of location-specific and ecosystem based approach to agri-industrial development. This strategy considers the development of growth network linking two or more growth centers, one of which is the Naga-Iriga-Legazpi in Region V. Third is the promotion of competitive and strategic commodities and industries critical to agri-industrial development. These commodities include rice, corn, sugar and coconut. The industries are animal feed ingredients, cut flowers, livestock and poultry, fresh and processed fruits and vegetables, and gifts, toys, handicrafts and housewares.

To reflect the above shifts in policies, the targets for both the agriculture and industry have also been correspondingly adjusted. The share of agriculture in GDP will decline from 22.5% in 1994 to 19.8% in 1998. Industry's share in GDP will, however, increase from 34.8% in 1994 to 36% in 1998. This trend is indicative of the transformation of the economy as it gradually shifts to greater agri-industrialization. The GVA for agriculture is projected to grow between 2.7% to 3.4% during 1993-1998, while the GVA for industry will grow from 4.7% to 5.7% in 1994 to 8.9% to 11.4% in 1998.

Paddy rice, as a basic commodity, will maintain a self-sufficiency level of 10 million metric tons by 1998. The production is projected to grow by an average rate of 3.4% between 1993 and 1998.

2.2.3 Water Resources Development

Irrigation and potable water supply are two of the most fundamental components of the water resources sub-sector of the MTPDP. As regards irrigation, roughly 1.55 million ha or 50% of the potential irrigable area of 3.1 million ha nationwide are currently provided with irrigation water. The government plans to increase the irrigable areas by 1.93 million ha in 1998.

Lately, the government through Congress is contemplating to pass the irrigation crisis act of 1995. This proposed law provides ,among others, adequate funding in the amount of 145 million pesos to NIA as irrigation subsidy for the next five years for the operation and maintenance of national irrigation systems. In addition, funding for devolved communal irrigation projects in the amount of 560 million pesos will be included in the budget of NIA for the next two years. When this law becomes effective, it is expected that the pace of irrigation development will be accelerated.

Moreover, the government has also put priority in the construction of communal irrigation systems over the big and multi-purpose system. This is in line with the principles of full cost recovery and decentralization and/or devolution. Under this policy, it is now the responsibility of the LGUs to implement such systems with NIA providing assistance in community participation, construction, supervision and operation and maintenance.

With reference to water supply, the demand is relatively high. In other urban areas(outside of Metro Manila), only 47% of the households are currently provided with Levels II(public faucets) and III(household connections) water systems. On the other hand, only 72% of the rural households have access to Level I(point source) water system. It is the plan of the government to increase the access to potable water supply by 71% of the households in other urban areas and 85% of the rural households in 1998. The LGUs have been given enough

clout and teeth to implement these type of water systems by virtue of the local government code.

2.2.4 Integrated Area Based Programs

A basic approach being pursued by the government is the implementation of projects in an intersectoral manner. This is to maximize scarce resources and stimulate growth in the rural areas. A number of these programs(e.g agricultural extension, maintenance of basic facilities, etc.) have already been devolved to the LGUs. As such, the local chief executives play a critical role in ensuring that these projects are implemented under their direct supervision. To further ensure that the concerns of the national agencies are forged by the LGUs, a memorandum of agreement is normally signed by the concerned department and local chief executive, with additional resource allocation extended by the national agency. The NEDA Secretariat has also designed the clearing and monitoring system(CMS) for the LGUs. The CMS provides guidelines on how the LGUs can directly access grants from multilateral and bilateral donor countries.

The scheme of implementing WLIRDP is expected to be patterned from the above-mentioned approach. The components of the project, although selected, are envisaged to be pursued in a holistic manner to ensure that poverty alleviation as a major goal of rural development will be properly addressed.

2.2.5 Institutional Setting of the Project

The institutional setting of programs and projects in the Philippines is governed by two principles. These principles are participatory and decentralization and/or devolution. Under the first principle, NGO-GO collaboration and more bottom-up planning are being instituted to reflect the local sentiments of the people. The second principle emphasizes greater autonomy to the LGUs, and "no programs and projects of the national government shall be implemented without prior approval and participation of the LGUs".

Following the above principles, the institutional structure of WLIRDP is foreseen to be composed of the LGUs; national agencies, including the academe; and local-based NGOs. The provincial government of Albay and municipal governments of Camalig and Daraga are expected to be major institutional players. These LGUs will have direct roles in the execution of the project components, especially on the devolved services. The devolved services include agricultural extension, farm to market roads, water supply, communal irrigation facilities and other basic services. The sectoral agencies notably NIA, PCA, FIDA DAR and other DA-attached agencies, including the local-based Bicol University are expected to support and enhance the capability of the LGUs to implement the project. Finally, the local-based NGOs will be relied upon in community organizing.

2.3 Fundamental Issues on Rural Development

The fundamental issues of rural development in the Philippines today can be broadly classified in three areas, namely: technical; institutional; and financial.

The technical issues pertain on the lack of synergy and complementarity of project components being pursued. Most rural development projects are still biased towards sectoral concerns. On the one hand, if the components are not sectorally biased, they are either incomplete to warrant successful integration. For instance, some irrigation projects are being implemented without effective market information system, including support for viable farmers' cooperative and credit. The other technical issue is on sustainability of facilities being implemented because of the apparent neglect to address critical environmental concerns such as watershed rehabilitation.

The institutional issue, on the other hand, is still the coordinative mechanism among the major project implementors, particularly the LGUs. While the lead agency concept, including the autonomy given to the LGUs are being espoused to address this issue, functional coordination remains a critical problem. This stems from the acute lack of skills in planning, programming and budgeting among the LGUs. Compounding this problem is the weak and inactive local councils being established to do coordination. In addition, there is virtual lack of good and effective LGU managers to implement multi-sectoral projects.

The financial issue refers to the inadequacy of funding support. It is to be noted that because of competing funds for government projects, financial resources are inherently subject to prioritization. In this instance, some project components are normally deferred for implementation or not being pursued at all because of this constraint. The Congress, however, is now taking appropriate measures to address this problem. For instance, the proposed irrigation crisis act is a notable example of a remedy being used by the Philippine government.

3. PRESENT CONDITION OF THE STUDY AREA

3.1 Location

The province of Albay is lying at the southern tail of Luzon island and approximately 550 km southeast of Manila. The province comprises 17 municipalities and one chartered city of Legazpi. The Study area is located within the municipalities of Camalig and Daraga. These municipalities are landlocked, lying less than 15 km from the eastern coast of the province and Albay Gulf, and are contiguous with each other in a shape of triangle with the apex at Mt. Mayon Volcano. The area of the municipalities are bound on the east by Legazpi city; on the west by the municipalities of Guinobatan and Jovellar; and on the south by the municipality of Jovellar and the province of Sorsogon. The municipalities have a total land area of 249.5 km² covering 104 barangays.

The Study area covers 41 barangays, 20 in Camalig and 21 in Daraga, with around 106.1 km² or 43% of the area of two municipalities. The Study area extends to northwestern part of Legazpi City as shown in the Location Map.

3.2 Demography and Socio-economic Situation

The population in the Study area was around 49,000 in 1990. This translates to a population density of 4.7 persons/ha which was higher than the provincial average of 3.5 persons/ha. The population growth rate of the Study area between 1980 and 1990 was 0.74%/year. This was lower than the national average of 2.35%/year, the regional average of 1.18% and the provincial average of 1.11%/year. The demographic comparison is summarized as follows (Ref. Table F.3.1):

Item (1990 Data)		Study Area	Albay Province	Region V	Philippines
Area	('000 ha)	10.6	255	1,763	30,000
Population	('000)	49	903	3,910	60,703
Population Density	(Person/ha)	4.7	3.5	2.2	2.0
Population Growth	(%/year, 1980-90)	0.74	1.11	1.18	2.35

The total population and number of household in the Study area (41 barangays) in 1995 were estimated at around 51,560 and 9,640, respectively based on the population growth rates between 1980 and 1990 by respective barangays. This means an average family size of 5.3. The population of the Study area slightly increased at the rate of 0.74%/year, while the population in 15 barangays decreased ranging between -0.02 and -2.16%/year. The population decline was brought about by the combined effects of declining birth and increasing outmigration rates due to the inability of the rural economy to provide goods and services as well as adequate employment opportunities. The urban growth proceeds from the remote areas to the areas located along the national roads, especially Daraga poblacion. The population density of the Study area was estimated at 4.9 persons /ha in 1995. The demographic features are summarized as follows (Ref. Table F.3.2, Fig. F.3.1 and F.3.2):

Item	Camalig Municipality	Daraga Municipality	Study Area (41 barangays)
Area (ha)	13,090	11,860	10,610
Population			
1970	38,946	58,335	39,857
1980	46,823	73,153	45,905
1990	49,961	83,603	49,401
1995/Estimate	51,606	89,357	51,563
Population Growth (%/year)			
1970-90	1.25	1.82	1.08
1970-80	1.86	2.29	1.42
1980-90	0.65	1.35	0.74
Household Number			
1990	9,216	15,551	9,243
1995/Estimate	9,557	16,548	9,638
Family Size (1990)	5.4	5.4	5.3
Population Density (/ha, 1995)	3.9	7.5	4.9

The illiteracy rate of the household population of more than 10 years old was estimated at 4.9% in 1990. This is lower than the national average of 6.5% and slightly higher than the regional average (Bicol) of 4.7%. The illiteracy rate varied from 0.3% to 19.1% by barangays. The educational attainment of more than 20 years old population consisted of pre-elementary and elementary level (63% of the population), high school level (22%), and college and above level (15%) (Ref. Table F.3.3 and F.3.4).

The economy of the Study area is generally dominated by agriculture. The number of registered establishments in the two municipalities is about 919 of which 37% are agri-related such as rice mills, dealers of agricultural inputs and outputs, retailers of agricultural products, etc. Majority of the establishments except rice mills, are located at Camalig and Daraga poblacions (Ref. Table F.3.5).

The employment rate in Albay province in 1994 was estimated at 95.8%, a little higher than the national average of 91.6%. An underemployment rate in the region recorded a higher rate of 39.4% than the national average of 20.9%. This means less employment opportunities in the region. The Study area can be assumed to have a similar situation as the region because of the dominance of coconut mono-cropping and limited number of establishments. The annual income in the province was lower, estimated at ₱ 39,323 which accounts for 60% of the national average of ₱ 65,186. The annual income of the rural areas in the region was 32% lower than the urban incomes. The economic indicators are summarized as follows:

Item		Albay	Region V	Philippine
Labor Force	('000)	452	2,005	27,479
Employed population	('000)	433	1,918	25,171
(Share of Agri. Sector)	(%)	-	(55.8)	(44.7)
Employment Rate	(%)	95.8	95.7	91.6
Unemployment Rate	(%)	4.2	4.3	8.4
Underemployment Rate	(%)	-	39.4	20.9
Household Classification*				
Share of Agri. Household	(%)	33.4	48.2	36.3
Average Income*	₱	39,323	39,823	65,186
(Rural)		-	(34,851)	(41,199)
(Urban)		-	(51,219)	(89,571)
Average Expenditure*	₱	32,862	33,911	51,991
(Rural)		-	29,873	33,733
(Urban)		-	(43,165)	(70,551)

*; *1991 Family Income and Expenditures Survey, Others are in 1994*

3.3 Agricultural Land Use

The Study area comprises about 10, 610 ha. Approximately 7,080 ha or 66.7% of the total Study area are devoted to coconut plantation. About 1,770 ha are cultivated to annual crops, mainly rice and corn. Paddy fields occupy about 1,350 ha or 12.7% of total Study area. About 1,225 ha are rainfed paddy fields. Upland crops planted in open areas, not inter-cropped under coconuts, occupy about 420 ha or 4% of total area. Corn is the major crop planted in the open uplands. Shrubs and grass lands occupy 1,340 ha or 12.6% of the total area. Residential areas, roads, and other types of land use occupy about 420 ha or 4% of the total Study area. The present land use is summarized in Tables F.3.6 and F.3.7 and shown on Fig. F.3.3.

Land Use	Area (ha)	Per cent of Total
Paddy Field	1,350	12.7
Coconut	7,080	66.7
Upland crop area/Open	420	4.0
Shrubs & Grass	1,340	12.6
Build-Up Areas	220	2.1
Others	200	1.9
Total	10,610	100.0

Land slope is a major factor to be considered for appropriated management of soils in the uplands. The study area is characterized by intensive and continuous rainfall pattern. There is a possibility that soil erosion and land degradation occur on steep slope unless proper land management practices are introduced. The present land use by slope range in the upland of the Study area is summarized as follows:

Slope Range (%)	Coconut Land		Annual Crop Land		Shrub and Grass		Total	
	ha	%	ha	%	ha	%	ha	%
0 - 3	2,180	30.8	205	48.8	385	28.7	2,770	31.3
3 - 8	1,025	14.5	120	28.6	175	13.1	1,320	14.9
8 - 18	1,440	20.3	95	22.6	525	39.2	2,060	23.3
18 - 25	2,330	32.9	-	-	170	12.7	2,500	28.3
25 - 40	105	1.5	-	-	85	6.3	190	2.1
Total	7,080	100	420	100	1,340	100	8,840	100

3.4 Land Holding and Tenure

The agricultural land holding data as provided in the Census of Agriculture in 1991 indicates a large occupancy of small farms below one ha as well as tenanted and leased farms in Camalig and Daraga municipalities. The farms are defined as a unit of owner-based land holding. The average sizes of farms in Camalig and Daraga are 1.67 ha and 1.36 ha, respectively. The share of number of farms below one ha is 45% in Camalig and 55% in Daraga. By tenure, the share of tenanted and leased farm area is 39% in Camalig and 29% in Daraga. The regional comparison on agricultural land holding is summarized as follows (Ref. Table F.3.8):

Item (1991 Data)	Camalig Municipality	Daraga Municipality	Albay Province	Region V	Philippines
Average farm area (ha)	1.67	1.36	1.76	2.48	2.16
Number of farms by size (%)					
Below one ha	45.2	54.7	46.4	35.9	36.6
1.00 - 2.99 ha	37.7	33.9	40.5	39.1	42.7
More than 3.00 ha	17.1	11.4	13.1	25.0	20.7
Area by tenurial status (%)					
Owned/partially owned	49.3	58.6	71.0	74.2	81.0
Tenanted/leased	39.4	29.4	26.0	24.2	15.4
Others	11.3	12.0	3.0	1.6	3.6

The land ownership records by barangay as of the middle of 1995 in the Study area were collected from the provincial office of DAR. The total number of land parcel records collected were 11,578 consisting of 5,747 records in Camalig excluding Poblacion and 5,831 records in Daraga. These were sorted by name of land owners and eventually bringing the records to 3,919 in Camalig, and 3,912 in Daraga. One owner has an average of around 1.5 land parcels. The above data were analyzed to be able to assess the holding distribution of paddy, coconut and total land.

The parcels of paddy land below one ha are roughly 90% in number or around 61% of the total area of paddy . The coconut land parcels below one ha are 69% in number or 30% of the area. The average land holding sizes are 0.62 ha for paddy, 1.41 ha for coconut and 1.30 ha for total land (Ref. Table F.3.9, Table F.3.10 and Fig. F.3.4).

The median sizes of land holding are: 0.36 ha for paddy land; 0.74 ha for coconut land; and 0.62 ha for total land. The share of holding area is limited at 16%, 13% and 12%, respectively. In general, the agricultural land holding in the Study area is relatively small, especially for paddy land. This is further unevenly distributed among the land owners (Ref. Table F.3.11).

Item		Paddy Land	Coconut Land	Total Agri. Land
Registered Area	(ha)	1,562	7,603	10,177
Registered No. of Parcel	(No.)	3,151	7,468	11,578
Registered No. of Owner	(No.)	2,519	5,396	7,831
Average Holding Size	(ha/owner)	0.62	1.41	1.30
Median Holding Size	(ha/owner)	0.36	0.73	0.62
Share of Cumulative Area to Median	(%)	15.8	12.7	11.7

According to the holding sizes of median land owners, the barangays were classified by three categories (small, medium and large) using the average and standard deviation of the median sizes by barangay. Similarly, the barangays were classified using the share of cumulative area up to the median size land owner vis-a-vis total area. The results of the cumulative area analysis implies that the agricultural lands of barangays classified as more equitable are comparatively evenly distributed. The barangays classified as less equitable are comparatively inequitably distributed. The results are summarized below (Ref. Fig. F.3.5 and F.3.6) .

Formula	m-0.5Ò> x	m-0.5Ò<= x <m+0.5Ò	m+0.5Ò<= x
Classification	Smaller	Medium	Larger
Median Scale of Land Owner (ha)			
Total land	0.56	0.56 - 0.90	0.90
Paddy land	0.34	0.34 - 0.56	0.56
Coconut land	0.58	0.58 - 0.94	0.94
Classification	Less Equitable	Medium	More Equitable
Cumulative Area upto Median Owner (%)			
Total land	12.43	12.43 - 15.71	15.71
Paddy land	15.67	15.67 - 24.81	24.81
Coconut land	12.83	12.83 - 16.41	16.41

Note: m ; average Ò ; standard deviation

According to the Household Survey completed by NSO in 1990, around 82% of the total residential households in the Study area excluding, Camalig poblacion, do not own agricultural land. The number of households in the Study area, excluding Camalig poblacion, was around 8,600 in 1990 and was estimated at around 9,000 in 1995. Based on the assumption of non-agricultural household occupancy covering 10% of the total household, the number of land less agricultural households is estimated at around 6,500. This accounts for 72% of the total households in the Study area. On the other hand, the land owner households are estimated at 1,600 which accounts for 18% of the total household. Based on the registered number of land owner (7,831) and the number of land owner household (1,600), the number of land owners per owner household is estimated at 4.9 which is similar to the average family size of 5.3, . This means that most of agricultural lands in the Study area were already fragmented by family members (Ref. Table F.3.12).

3.5 Cropping Pattern and Farming Practices

3.5.1 Cropping Pattern

The agriculture production in the Study area is rainfed, with the exception of about 125 ha of irrigated rice. The cropping pattern is greatly determined by the rainfall pattern. The main concern of lowland paddy rice farmers is to harvest before the occurrence of pronounced rainfall and destructive typhoons. Farmers in irrigated areas can adjust the planting time to reduce risk of damages by excessive rainfalls and typhoons, but farmers in rainfed areas must wait until the rainfall is enough for planting.

The planting of first paddy rice season in irrigated areas is between May and July, while for rainfed areas is between June and August. The harvesting of first cropping is between September and October in irrigated areas, and October to November in rainfed areas. The second planting of paddy rice is between mid November and December for both, irrigated and rainfed. The second harvesting season is between March and April. The normal present cropping pattern of paddy fields is summarized as follows:

	First Cropping Season		Second Cropping Season	
	Planting	Harvesting	Planting	Harvesting
Irrigated	May to August	Sept. to October	Nov. to Dec.	March to April
Rainfed	June to August	October to Nov..	Nov. to Dec.	March to April

In rainfed paddy fields the harvested areas are often smaller than the planted areas because typhoons damages during the first cropping season and insufficient rainfall during the second cropping season. The cropping intensity based on the harvested area varies in the range between 139 to 165% in rainfed areas and between 170 and 180% in irrigated areas.

A large percentage of corn growing farmers make two harvests per year. The first cropping season is planted between May and June. The harvest is made between August and

September. The second cropping season of corn is planted between December and January, after the heavy rains. The second harvest of corn is between March and April. The average cropping intensity in corn areas based on the harvested area is in the range between 130 and 160%.

Cassava and sweet potato are planted throughout of the year, except in the months of excessive rainfalls or drought spell. The normal cropping patterns of rice and corn are shown in Fig. F.3.7.

3.5.2 Farming Practices

Inadequate farming practices coupled with the lack of irrigation are the main causes of low yield in rainfed paddy rice. A comparison of the recommended farming practice with the actual level of crop husbandry commonly done in the Study area is given in Table F.3.13. The level of agricultural practices for rice husbandry in the Study area varies significantly among farmers in irrigated and rainfed areas. Farmers in rainfed paddy fields normally use low level of input to minimize the risk of economic losses due to inadequate rainfall. Most farmers in the rainfed paddy fields use rice kept from their previous harvest as source of seed material. Only about 18% of farmers, mainly in irrigate areas, use certified seeds. The certified seeds are mostly provided to the farmers under the Grain Production Enhancement Program (GPEP) of DA. The rice variety most commonly planted is IR 64, while several other varieties such as IR 60, IR 78, IR 74, etc. are planted by small number of farmers.

Plowing and harrowing in paddy fields are mostly done using animal traction. Small hand-tractors are used by some farmers, mostly in Camalig area, to do the last harrowing before transplanting. Transplanting is the common method of growing rice. Farmers on irrigated rice fields apply medium level of fertilizers, while most of the rainfed rice farmers apply fertilizes below the medium levels recommended by the extension service. For the average fertility level of soils in the Study area, the amounts of nutrients recommended to obtain high yield of paddy is in the order of 80 to 120 kg/ha of N, 45 to 60 kg/ha of P, and 60 kg/ha of K. Farmers in rainfed areas apply 50 kg of 14-14-14 plus 50 kg of urea, in average. Poor control of weeds and pests are important causes for yield reduction in paddy rice.

The average labor input for rice farming is about 55 man-day, which is less than the average in Region V. The distribution of labor sources is commonly a combination of family labor (about 24%), mutual help labor (about 35%), and hired labor (about 41%). The distribution of labor used in paddy fields is as follows:

Family Activity	Labor used (M-D)	Farming Activity	Labor used (M-D)
Land Preparation	14	Weeding	17
Transplanting	8	Harvesting	11
Application of Fertilizer	2	Hauling	2
Application of Pesticides	1	Total Labor	55

Corn is planted twice a year both, in open lands and inter-cropped in coconut areas of low density of trees. The land preparation is made by plowing using draft animals. Some farmers plow the land in the direction of the slope, causing erosion in some areas. Normally contour furrows are not prepared. The average amount of fertilizer applied is in the range between 30 kg/ha of N, 10 kg/ha of P, and 12 kg/ha of K, which do not satisfy the requirements for the type of soil in the area. Organic fertilizer, such as compost and green manure are not being used.

Corn production is being supported through (GPEP) of DA. A large number of corn farmers are provided with hybrid seeds, fertilizers, and intensive technical assistance through GPEP.

The average labor used in corn production is about 28 man-day. The major demand of labor is for weeding (9 M-D), followed by harvesting (7 M-D), and land preparation (4 M-A-D).

The husbandry of the coconut plantations is normally inadequate. Most coconut farmers limit their activity to periodical harvesting. The application of fertilizers to coconut trees is virtually negligible, except for the small number of farmers that receive fertilizers (150 kg/ha of ammonium sulfated and 120 kg/ha of KCl) from PCA's coconut improvement programs. Shrubs are competing with the coconut trees in large percentage of the farms. There is about 2,300 ha of unproductive coconut trees that need to be replanted. It has been proven that introduction of inter-cropping farming system under the coconut plantation result in improvement of coconut yield. Inter-cropping is limited to about 10% of the coconut farms in the Study area.

3.6 Crop Yield, Production and Food Balance

3.6.1 Crops Yield

The comparison of average yield of main crops in the Study area with the average yield of the whole country, Bicol Region, and Albay province is presented below. The yield of coconut is lower in the Study area compared with the national, region, and provincial yields. The average yield of paddy rice obtained in the Study area for both, irrigated and rainfed is slightly higher than the regional and provincial average, and slightly lower than the nation average as shown below (Ref. Table F.3.14):

(Unit: ton/ha)

Crop	Philippines	Region V (Bicol)	Albay Province	Study Area
Coconut	3.7	2.0	4.2	1.0
Irrigated Rice	3.3	2.9	2.7	3.2
Rainfed Rice	2.1	1.7	1.7	1.9
Corn	1.4	0.8	1.0	1.2
Abaca	0.8	1.0	0.9	0.8
Cassava	8.7	8.1	10.2	7.0
Sweet potato	4.8	5.8	6.9	5.4
Eggplant	6.9	4.5	5.5	4.9
Tomato	9.0	5.3	5.3	5.3

As previously indicated, husbandry for most crops are normally insufficient, therefore yields obtained are low in many cases. Improvement of technical and financial capacity of farmers will result in improvement of yield and production.

3.6.2 Crop Production

The production of major crops within the Study area are: coconut production is about 7,080 tons per year; Paddy rice production is about 4,920 tons per year; and corn production is about 1,460 tons per year. The average annual production of each commodity is summarized as follows (Ref. Table F.3.15):

Paddy Rice

	Physical Area (ha)	Planted Area (ha)	Harvested Area (ha)	Production (tons)	Yield (tons/ha)
Irrigated					
1st Cropping	125	125	115	380	3.3
2nd Cropping	125	115	98	300	3.0
Rainfed					
1st Cropping	1,225	1,225	1,100	2,570	2.1
2nd Cropping	1,225	985	570	1,670	1.7

Corn

	Physical Area (ha)	Planted Area (ha)	Harvested Area (ha)	Production (tons)	Yield (tons/ha)
Open areas					
1st Cropping	400	400	380	600	1.5
2nd Cropping	400	380	270	380	1.0
Inter-cropping					
1st Cropping	240	240	220	290	1.2
2nd Cropping	240	190	130	190	1.0

Others

Crop	Planted Area(ha)	Production (ton)	Yield (ton/ha)
Coconut	7,080	7,000	1.0
Sweet potato	120	660	5.4
Cassava	50	350	7.0
Abaca	60	50	0.8
Eggplant	20	100	5.0
Tomato	10	50	5.0

3.6.3 Food Balance

The annual production of most food crops do not satisfy the estimated demand for the population of the Study area. Paddy rice production in the Study area is about 4,920 tons, this represent only 62% of the estimated demand of some 7,960 tons necessary for the population of 1995. The annual production of sweet potato is about 660 tons against a demand of some 840 tons. Cassava production is 350 tons and the estimated at about 150 tons, while the demand is 1,360 tons. The annual production of mungbean is only about 2 tons, while the demand is estimated at 30 tons. The only commodity that is produced in excess of the demand is eggplant.

The demand of yellow corn for animal feed was estimated for the total population of swine and poultry within the Study area as of 1994. The resulting estimated annual demand of yellow corn is 2,390 tons, while the annual production is about 1,460 tons.

Commodity	Production	Demand	Surplus / (Deficit)
Paddy Rice	4,920	7,960	(3,040)
Yellow Corn (feed)	1,460	2,390	(930)
Sweet Potato	660	840	(180)
Cassava	350	1,360	(1,010)
Banana	150	510	(360)
Eggplant	100	60	40
Mungbean	2	30	(28)

3.7 Crop Budget

The crop budgets for main crops under present condition are summarized as follow:

Cash Cost	Rice (Irrigated)	Rice (Rainfed)	Coconut	Corn	Abaca	Cassava	Sweet potato	Eggplant
Seeds	250	150	0	775				
Fertilizers	1,560	750	250	675				
Insecticides	650	450	0	200				
Fungicides	250	150	0	0				
Paid Labor	2,000	1,700	1,750	1,200				
Paid Animals	1,000	870	500	400				
Rent equipment	750	500	300	150				
Miscellaneous	650	300	200	250				
TOTAL	**7,110**	**4,870**	**3,000**	**3,650**				

3.8 Livestock

Livestock production within the study area is a minor economic activity at backyard level, with farmers having few heads of different animals. The variations in livestock population in Daraga and Camalig municipalities from 1990-1994 are presented in the Table below. In Daraga during the period , the cattle population did not change significantly, while the population of swine and goats decreased. The population of carabao, chicken, and duck increased. In Camalig during the period 1990-1994, the population of cattle and duck increased, while carabao, swine, chicken, and goat decreased (Ref. Table F.3.16).

	Daraga		Camalig		Study Area	
Year	1990	1994	1990	1994	1990	1994
Cattle	2,930	2,985	2,155	2,925	2,820	3,130
Carabao	2,675	3,040	1,890	1,760	2,100	2,470
Swine	7,395	5,580	6,030	5,840	7,250	6,500
Chicken	18,675	22,410	37,040	30,765	29,300	30,175
Duck	1,090	1,205	770	1,520	820	1,860
Goat	340	280	600	490	470	440

The limiting factors for increasing production of livestock and poultry are the difficulty in acquiring good animal stock, reduced introduction of forage production, high costs of commercial feeds and medicines, etc. Also, the incidence of parasite diseases is high, mainly during the long periods of rain.

A cattle production program was initiated in the past with the introduction of animal stock imported from Australia. A large percentage of the animals died due to stress during transportation and no adaptation to the management condition implemented by the farmers.

In the Study area there is milk processing plant being currently operated by a cooperative. The plant has an installed capacity of about 200 liters of milk per day, but because of the scarce production of milk in the area, the actual quantity being processed is only about 50 liters.

The DA's regional laboratory of animal health is located within the Study area. The services provided by the laboratory include analysis of disease and parasites, and analysis of nutrient content of forages. Also, the laboratory provide some medicines. The operation capacity of the laboratory need to be strengthened.

3.9 Post Harvest and Marketing

3.9.1 Post-Harvest Practices at Farm Level

(1) Paddy Rice

Paddy rice is harvested by sickle is threshed by manually or using mechanical thresher. In the Study area, around a half of harvest are threshed by beating. Mechanical thresher is used under custom threshing service of which share is around 4% of the total threshed paddy rice (2 kg to 50 kg/one cavan). All of mechanical threshers are privately-owned and no existing cooperatives operate mechanical threshers in the Study area.

Each of barangay has concrete a concrete sun-drying floor for drying paddy rice, copra and corn. Some farmers own sun-drying floor, while those owners are a few in the study area. The capacity of sun-drying floor in the barangays producing paddy rice is normally insufficient to meet all the output and could cover only the requirement for home consumption. Paddy rice set aside for home consumption are traded as wet palay at very low prices.

(2) Coconut

Coconut farmers usually pick matured nuts using a bamboo pole with a scythe at the top. Coconuts dropped from the trees are collect, piled and dehusked. The dehusked coconut (copra with shell) is slitted into two parts before it is being dried. First, the copra with shell is dried on bamboo nodes for 8 to 14 hours depending on weather and moisture contents. Dried copra with shell is scooped out from the shell. The shelled copra is again dried using sun drying or smoke-kiln method. It takes around 6 to 8 hours by sun drying and 6 to 12 hours by smoke-kiln. Most copra drying facilities in the Study area are direct smoke dryers which are owned by individual coconut farmers. There are no facilities being jointly used by farmer groups or cooperatives except concrete floor for sun drying.

The prevailing drying facilities are locally made using coco lumber for structure, bamboo nodes and nippa for roofing. The drying structure consists of the upper part of pillers and roofs and underground part for firing coconut husk. The floor of the drying house at ground level is copra bed made of bamboo nodes surrounding coco lumber, where copra is dried by heated smoke air from the underground fire bed. There are two types of smoke dryers, i.e. direct and semidirect types. The direct type is designed that the fire bed is located below the copra bed. The fire bed of the semidirect type is located on of the dryer and connected to the drying bed by a tunnel flue. The direct type has a risk firing copra directly from the fire bed, while the semidirect could minimize such a risk.

In 1991, Philippine Coconut Authority has tried to introduce an improved drying facility with supply of free material (₱ 6,100) and technical assistance under Small Coconut Farmers' Organization Project. The improved dryer is a hot-air dryer which copra is dried by means of uncontaminated air that passes through the copra bed. The hot-air dryer could produce white copra instead of colored copra. In addition, the hot-air dryer could be used for corn and other products. The structure of this dryer consists of a flue tube located the drying chamber which is made of four empty drums jointly connected end to end, and a chimney where the smoke exits. The flue tube serves as a heat generator. It is heated by charging fuel inside of the drum.

There are no incentives to use the hot-air dryer because of no price different between white and colored copra in the study area. In addition, due to difficulties on joint utilization among farmers, the dryer has not been utilized anymore since the broken of the drums.

(3) Abaca

The processing of abaca fiber in the Study area is normally a backyard scale. Stripping by hand using a Benito knife is common and no spindle-stripping machine is being introduced.

There is no specific time for harvesting of abaca stalks, while the best fibers are generally produced during the dry season. Stalks can be harvested three to five months before the flagleaf appears. The area surrounding the base of stalk is cleaned through removing dried leaves, grasses and other weeds. With the use of a curved knife, the leaves of the stalk are cut. Tumbling is done using a sharp tumbling bolo. Delayed stripping reduces the quality of the fiber because of the acid content of the sap in the stalk. Tuxying (the process of separating the primary fiber layer from the secondary fiber layer of a leafsheath) and stripping should be done on the same day.

The traditional methods of stripping are by hand. Cleaning is done with a Benito knife, with or without serrations on the blade. The tuxy is inserted towards the stripper and the foot pedal is released. The tuxy is pulled away with force by the use of both hands which are clasping the tuxy with a wooden pulling aid. Several pulls are necessary if the tuxy is long. The stripped fibers are segregated according to their leafsheath origin. The fibers are brought to an open area for sun-drying or air-drying. The quality of fibers is depend on the number of serrations and the pressure exerted by the stripper on the knife.

The spindle-stripping is a semi-mechanized method of extracting fiber. The machine has a revolving wooden spindle which wraps the fiber so that they are wound on the spindle. The spindle is kept in motion by motor or engine at 2 to 3 Hp. The spindle machine can strip faster with more texies each time and with only two even pulls, regardless of the length of the tuxy. The spindle-stripped fiber is superior to a hand-stripped fiber.

3.9.2 Marketing Conditions

The study area is favorably accesssible to the public markets in Daraga, Camalig and Legazpi city. Should the roads linking the respective barangays are improved through the barangay road development, the accessibility of some of the barangays will be greatly improved, especially during heavy rains. In addition, the Study area is located along the national highway linking Naga, Camarines Sur and Legazpi city and to Sorsogon province. With the development of appropriate infrastructure facilities coupled by enhancing farm production, the Study area could be a potential site for assembling and processing of agricultural products coming from the said provinces.

The public markets in Daraga and Camalig poblacions are main trading centers for the Study area. The Daraga public market is strategically located along the national highway from the northern part of Luzon and bound for Sorsogon and Legazpi city. The new Camalig public market is under construction and also located along the national highway. The both public markets are operated by the municipal government under the management of respective market administrators. Market collectors collect daily fees by issuing cash tickets to the tenants. Market days are scheduled on Monday and Thursday in Daraga and Tuesday and Friday in Camalig. The number of registered stall holders in the both public markets is around 323 in Daraga and 78 in Camalig. Trading stalls for agricultural inputs and outputs occupy 124 (38% to the total) in Daraga and 42 (54%) in Camalig.

No other temporary and occasional markets are opened in the Study area except Anislag barangay. The Anislag market is located beside the cock fighting stadium and operated every Sunday. Both facilities are managed by the barangay council, while the property including land is owned by the barangay captain. The locally products such as pork, vegetables, and root crops as well as the vegetables brought from Benguet, Pangashinan or Nueva Ecija are traded together with livelihood dry goods.

Agricultural products are locally assembled or traded in Camalig and Daraga public markets. Several products in Comon, Del Rosario and Panoypoy in Camalig municipality are traded in both public markets. Magogon's products are traded in Daraga poblacion due to its accessibility to Daraga. The other barangays' products are traded in the respective public market (Ref. Table F.3.17).

3.9.3 Trade of Agricultural Products

(1) Rice

The major rice producing municipalities in Albay province are Oas, Libon and Ligao. The province has a enough rice production to meet the demand of its population with very little marketable surplus. In case of shortage of rice supply due to natural calamities, however, rice is imported from Camarines Sur. During great calamities in late 1993 up to the beginning of 1994 and November 1995, Central Luzon through Manila and Iloilo supplied rice to Albay province.

The current marketing channel for palay is dominated by private dealers. A few of the primary cooperatives are engaging in the trading business, but the volume traded by them is nothing compared with private dealers. Farmers are forced to sell wet paddy rice at lower price, especially farmers who are indebted to dealers. Public and privately owned concrete sun-drying floors are prevailing in the Study area, while those drying capacities are not sufficient. More sun-drying facilities or mechanical dryer would be necessary for increase in farmers' prices of palay as well as improvement of rice quality.

The rice dealers traded in the Study area could be classified into barangay and municipality based dealers. The barangay dealers procure paddy rice from farmers and sell to municipal dealers. The most of existing rice mills in the study area could produce only lower quality of rice due to their low efficiency. The municipal dealers usually process paddy mainly in the cono-mills in Ligao, Polangui and Libon to increase milling recovery and quality of milled rice. The dealers sell rice mainly to retailers in the Study area.

The NFA procurement of palay in Albay province was decreased from 9,339 tons in 1987 to 2,492 tons in 1993 and 45 tons in 1994 mainly due to shortage of budget and lower support prices compared with prevailing marketing price. From Daraga and Camalig municipalities during 1990 to 1994, NFA procured three to 82 tons of palay which account for one % of the total procurement in Albay.

(2) Corn

The major corn producing municipalities in Albay province are Oas, Polangui, Libon, Tabaco and Pio Duran. White corn is produced in backyard mainly for home consumption. Yellow corn is traded as feeds for poultry and livestock in the form of corn grains or corn grits. Albay province supplies corn grains to Batangas and corn grits to a big feed mill in Camarines Sur.

Yellow corn grains produced in the Study area are sold mostly to private dealers same as paddy. A few of the cooperatives sell corn grains directly to Sto. Domingo Peoples Cooperative (SADOPECO) which operates feed and rice mills in Legazpi city . Feed millers (three in Daraga) receive most of their stocks from Polangui.

(3) Vegetables and Fruits

Locally produced vegetables such as tomato, eggplant, ampalaya and okra are traded through the private dealers and sold mainly in the public markets. Some farmers directly trade a small quantity with retailers in the market. Locally produced cabbage and pechay, which are mainly produced at higher elevation area on the footslopes of Mayon Volcano, are traded in the Daraga and Camalig public markets as well as Legazpi city through the local dealers.

Onion from Nueva Ecija, garlic from Pangasinan and Nueva Ecija, and cabbage, Irish potato and sweet peas from Benguet are regularly supplied to the public markets throughout the year by the local and outside dealers from Nueva Ecija, Pangasinan, and Metro Manila. These vegetables are transported weekly using jeepney or seven tonner truck. The dealers drop a certain volume of their stocks in the municipalities along the national highway and make their final stop in Legazpi city, Tabaco or Sorsogon. Some outside dealers contracted with the local retailers operate unloading truck yard for cleaning and packaging of vegetables. These traders distribute vegetables on credit for 15 days and collect sold amount on the next distribution day.

Majority of locally produced fruits are also assembled by the local dealers and sold to the retailers in the public markets. Guinobatan municipality is the largest banana producer in Albay province although the crop is produced in every municipality. Citrus, pineapple and mango are also produced locally. Sometimes these fruits come from nearby provinces in the lean season. Production of papaya is being encouraged in Camalig municipality and being sold in Manila. The production, however, is affected by frequent typhoon.

(4) Copra

Coconuts are primarily traded as copra for oil extraction. The private dealers dominate copra trading. Some dealers have established their buying stations at the barangay. Based on the an interview with private dealer in Daraga, 70 to 80% of the copra traded are directly brought from the farmers and the balance is coursed through the buying stations. From the traders, the copra is assembled by the copra brokers who directly trade with Legazpi Oil Company, a coconut oil manufacturer. There are 20 registered copra dealers in Daraga and Camalig municipalities of which three are considered as copra brokers.

Around 90% of copra in Region V goes to Legazpi Oil Company which operates integrated facilities such as oil mill with a capacity of 400 tons/day, warehouse of 24,000 to 25,000 tons and wharf. All facilities are located in Legazpi City. The company directly exports crude coconut oil or ships them to the factory in Batangas for further refining process depending on the world market price.

(5) Abaca

Despite the rapid decline in abaca production, Albay is still the biggest processor and exporter of abaca product in the country. The devastation brought by the bunchy top and abaca mosaic disease infestations on the abaca plantations has caused the province to regularly import abaca fiber from the other provinces, i.e. Samar, Leyte, Davao and Zamboanga. The production of abaca in the Study area is prevalent on a backyard production with very limited scale.

Isarog Pulp and Paper Co. in Daraga and Albay Agro Industrial Development Corporation in Malinao procure abaca locally and from the other provinces for processing and exportation of high quality pulp. They demand more supply of abaca fiber because of enlarging world market demand.

(6) Coffee

The coffee production has been encouraged in Bicol region by Department of Agriculture and Nestle Philippine Inc.,. Compared with the first grade coffee produced in Cavite, the locally produced coffee is classified as third grade. The farmers in the Study area usually harvest immature / green beans to avoid stealing of coffee by local people. The green beans or dry bean after removal of cherry are procured by dealers who bring dry beans to the Nestle's processing factory in Alabang, Metro Manila. Nestle Inc. has the buying station in Naga and is constructing the new assembling center in Legazpi city.

(7) Livestock

Cattle and swine fattening are very common sources of additional income among farmers in the Study area. The trading of livestock is also dominated by the private dealers which sell them to the retailers mainly in the Daraga, Camalig, Guinobatan and Legazpi public markets. Livestock oksyon market that is nearest to the Study area is located in Ligao (around 15 km from the Study area along the national highway bound for Naga) and operated on Sunday. Cattle and carabao are traded in the Ligao oksyon market and brought to Batangas (Lipa, Pedre Gracia, Tanauan and Lemeny) and other provinces by the middlemen for further sale.

San Miguel Corporation is constructing a poultry dressing factory in Anislag barangay, Daraga. This factory will procure chicken not only form Albay province but also from Sorsogon province. The contract growing program is being promoted in other provinces. The participants are very limited due to capital investment requirement. For instance, investment for a chicken cage with more than 5,000 bird-capacity accounts for at least ₱ 350,000. The Study area could have an advantage to harness this contract growing because of good accessibility to the new factory.

3.9.4 Local Agro-Industry

(1) Rice and Feed Mill

There are 20 operating rice mills in the study area (6 in Daraga and 14 in Camalig). Most of existing rice mills in the Study area are classified as kiskisan and semi-cono. The former could produce only lower quality of rice with more than 26% of broken rice and the latter with 6 to 25%. The milling recovery rates of existing rice mills range from a low of 55% to a high of 70% at based on the interview survey of rice millers, while the milled rice contains a lot of small broken rice. The rice mills are operating mainly for custom milling at the rate of ₱ 0.5 to 0.6 /kg of rice. The annual milling quantity is estimated at around 3,900 tons of paddy which accounts for 80% of the total paddy production of the Study area (Ref. Table F.3.18 and F.3.19).

Production of high quality rice could be realized through proper drying of paddy rice and introduction of effective milling facilities. In fact, one trader in Camalig is constructing a new rice mill with a capacity of 0.95 ton of milled rice per hour to improve milling quality of rice. Except one flat bed dryer with a holding capacity of 1.5 ton of paddy in Anislag owned by a private dealer, mechanical dryers are not yet introduced in the study area.

One private feed mill is operated in Daraga poblacion and other two feed mills are newly constructed in Daraga poblacion and Namantao in Daraga municipality. The operating feed mill in Daraga poblacion has a production capacity of 300 ton per month. The corn grains for feed is procured mainly from Polangui and other municipalities through private dealers, while a quantity of corn grains from the Study area is minimal.

(2) Coir Factory

There are two coir factories in and around the Study area, one in Busay barangay, Daraga and the other in Gapo barangay, Camalig. The coir factory in Busay is operated by Ibaron Farmers Cooperatives composed of 17 members with paid-up capital of ₱ 440,000. The other is privately operated. The coconut husk is collected from coconut farmers surrounding the factories at the rate of ₱ 0.07 / piece. The major products of the coir factories are coco fiber for furniture, and coco conditioner and coco peat for seedling bed and soil improvement. Fascine netting coco fiber is produced and exported to Japan and Germany by the private coir factory.

(3) Handicraft

Daraga is a trading center of handicraft products in Albay province. Nine handicraft manufacturers in Daraga municipality and one in Camalig municipality are registered by Fiber Industry Development Authority (FIDA). In addition, 26 handicraft exporters in Daraga and two in Camalig are registered by Board of Investment, Department of Trade and Industry. Manufacturers and exporters supply abaca fiber and other raw materials to the contract farmers in general. The processing of abaca slipper is integrated by the dealers from Manila which sub-contract to individual local processors under the advance payment and without supply of raw materials. Farmers in the Study area could get additional income by engaging in this activities (Ref. Table F.3.20 to F.3.22).

Most of local manufacturers are classified as small to medium and normally encounter problems on shortage of working capital for procurement of raw materials and advance payment for contract farmers. There are no unified activities by local handicraft manufacturers on design of goods, market development, procurement of raw material, joint sales, etc. Exporters as well as manufacturers are individually managing their own business. In addition, there are no cooperative activities covering handicraft manufacturing and trading.

3.9.5 Marketing Prices

Price fluctuations of agricultural products were analyzed using the monthly retail prices collected at Legazpi public market. The price fluctuations for vegetables are larger than the other products because the former are only available on limited months and the demand during lean season is supplied by other provinces notably Benguet province. The average retail prices of major products and their standard deviations as indicator on degree of price fluctuation are summarized as follows (Ref. Table F.3.23 and Fig.F.3.8):

Item (1995 Data)		Average Price	Maximum Price	Minimum Price	Standard Deviation
Grains					
Rice/Ordinary	(₱/kg)	15.0	20.5	11.7	3.2
Corn grains	(₱/kg)	9.9	12.3	7.5	1.5
Vegetables					
Ampalaya	(₱/kg)	14.8	17.1	12.3	1.8
Cabbage/native	(₱/kg)	17.9	24.1	12.2	4.3
Pechay/native	(₱/kg)	12.8	26.8	3.8	8.6
Eggplant	(₱/kg)	13.3	14.0	10.6	4.2
Totamo/ripe	(₱/kg)	27.1	59.3	10.6	16.3
Fruits					
Banana/saba	(₱/piece)	1.3	2.6	1.0	0.5
Papaya	(₱/kg)	20.5	29.1	11.6	4.2
Pineapple	(₱/kg)	8.6	10.6	7.4	0.9
Meat					
Beef meat	(₱/kg)	117.4	119.9	113.7	1.7
Pork meat	(₱/kg)	82.7	89.3	77.5	3.8
Dressed chicken/ native	(₱/kg)	84.7	88.4	82.1	1.9
Eggs					
Chicken/Medium	(₱/piece)	2.6	2.8	2.5	0.09

The prevailing farmgate prices of agricultural inputs and outputs in the Study area, which were collected through the farm survey are summarized as follows:

Item	Unit	Farmgate Price
Inputs		
Fertilizer	(₱/kg)	
Urea		7.0
Ammonium Sulfate		4.4
Triple super phosphate		6.4
Muriate of potash (KCl)		5.6
14-14-14		7.6
Agro-chemicals		
Insecticide	(₱/lit.)	
Decis		550
Labor	(₱//man-day)	90
Man/Animal power	(₱/day)	180
Outputs	(₱/kg)	
Paddy		6.4
Corn grain		5.7
Copra		8.4

3.10 Farmers' Economy

The family income and expenditure by household group were analyzed based on the results of the farm household survey. The annual farm incomes of rice farmers with operating size of 1.3 ha on average were estimated at ₱ 30,400 for owner operators and ₱ 22,700 for tenants. Those of coconut farmers were ₱ 17,000 for owners (operating size of 2.3 ha) and ₱ 12,900 for tenants (2.4 ha). The farm incomes of owner operators are higher than those of tenants for each operating size by around 32 to 34%. The share of farm income to the total income becomes larger according to the the scale of operating size, i.e. in case of owners, 19% in small scale (0.25 ha) to 74% in large scale (4.33 ha) for rice farmers and 20% in small scale (0.18 ha) to 54% in large scale (3.16 ha) for coconut farmers. The livelihood of small and medium scale farmers below one (1) ha depends on non-farm income accrued mainly from occasional and permanent employment. The annual net reserves of rice farmers were ₱ 5,400 for owners and ₱ 1,900 for tenants. Those of coconut farmers were ₱ 2,800 for owners and ₱ 700 for tenants. It is obvious that farmers operating small size of farms, especially tenant coconut farmers, have no investment capacity for improvement of agricultural production. For the introduction of intensive farming in both lowland and upland, financial assistance will be indispensable (Ref. Table F.3.24).

4. BASIC AGRICULTURAL DEVELOPMENT PLAN

4.1 Current Constraints

4.1.1 Land Tenure

The non-completion of land transfer in most coconut lands is perceived as the main issue. For one, the incidence of tenancy is fairly high at about 72% of the total respondents based on the NSO Household Survey. This situation also pervades on lands under the retention limit. Neither DAR nor PCA monitor the relationship between the tenant and landlord in such areas. Under this circumstance, the incentive for the farmers to improve their farms in terms of application of modern farm inputs and intensifying production is rather restricted.

4.1.2 Agricultural Production

(1) Climate

The limiting factor about climate is the incidence of destructive typhoons. The Study area is frequently visited by strong typhoons coupled with continuous and lengthy rainy periods. This condition restricts the type of crops that can be grown, and consequently the cropping pattern is also affected.

(2) Physical

The constraints cover the following: (i) lack of irrigation facilities; (ii) poor road system within the confines of the agricultural lands; and (iii) shortage of farm equipment and post-harvest facilities. The lack of irrigation facilities prevents intensive cultivation of paddy rice. Roughly 85% of the total rice land in the Study area is currently under rainfed condition. This is the main reason for low and unstable yield. The poor road system also inhibits mobility of farm produce thus transport cost is very prohibitive. The shortage of farm equipment and post-harvest facilities is the main cause for the very low quality of paddy rice including copra. It is observed that this low quality dampens the farmgate prices of paddy rice and other crops.

(3) Technical

The constraints include the following: (i) low crop productivity both in lowland and upland due to lack of appropriate farming systems and technologies; (ii) risk of soil and land destruction due to improper farming techniques. The lack of appropriate farming systems is very evident. There are no models of good farming systems noticeable in the barangays which apparently implies a vague understanding of this approach among the extension agents. The planting of annual crops on steep slopes has also been observed in some barangays.

Soil destruction will be also expected to be a serious problem in case of wanton cutting of coconut trees for lumber. Furthermore the predominance of coconut mono-cropping without inter-cropping system is one of basic reasons for lower income level of farmers.

4.1.3 Marketing

Marketing of agricultural products in the study area is primarily dominated by private dealers and farmers' participation to agricultural marketing such as joint trading among the farmers, direct supply to the markets, processing and storage of marketable surplus by the farmer producers, etc. is not developed. Trading with private dealers is commonly mediated by advance payment to farmers or informal credit which becomes one of social and economic constraints for organization and management of cooperatives.

In case of palay, wet palay trading without drying and storage is prevailing. The capacity of drying and storage facilities owned individually by the farmers are short to handle the marketable surplus. Farmers are forced to sell wet paddy at a lower price because of immediate cash demand for their livelihood as well as shortage of drying and storage facilities in the area. There are no rice mills owned by farmer producers or cooperatives in the study area. In parallel with the irrigation development in the study area, palay based cooperatives as well as irrigation association should be organized and the cooperatives could be engaged in the post-harvest and marketing development of palay. For the sustainable irrigation development covering watersheds management, social and economic linkages between palay farmers and coconut/upland farmers would be necessary. Through the cooperative organization at lowland and upland area within the same watershed, the coordination activities covering exchange of labour, organic manure made from coconut husk, rice straw and rice husk, compensation to upland farmers at the critical watershed area, trade of products, etc. would be formulated.

Copra production is mainly done by the tenant farmers (a half share to the product) or care takers (one-third share) in the study area because distribution of coconut land under the CARP is not implemented in the study area. The livelihood of coconut farmers are significantly low and they depend heavily on the informal credit through trading with copra dealers. Beside copra drying and charcoal making, there are no farmers' processing activities using copra and coconut husk in the study area. There are no motivation to formulate a farmers' groups or cooperatives among coconut farmers despite the PCA's support programs such as free seedling and fertilizer distribution under the Small Coconut Farmer's Organization Program were implemented. An integrated program from the production to marketing covering diversification of income source from introduction of inter cropping and some farmers' education to give a future vision will be indispensable to reform social and economic status of coconut farmers.

Beside several failures of cooperative development in the study area, corn farmers in Magogon were organized as a cooperative and initiate a joint sales to the Santo Domingo Multipurpose Cooperative which is intensively supported by the government and NGO and functioned as a cooperative federation covering several municipalities in Albay province. Production of hybrid yellow corn in the study area is promoted by the free seed distribution under the Grains Production Enhancement Program, Department of Agriculture, while the post-harvest and marketing improvement is remained on the capability of cooperative without direct technical and financial assistance from the government. Even though the LBP financed the production loan to the corn based cooperatives, most of the cooperatives failed their repayment on time. Moral hazard as well as typhoon damages would affected to the cooperative management. Marketing development for the farmer producers could be promoted on the basis of strengthening of cooperative organization and management, and step-wide increase in cooperative capital formation which could be solely realized by the intensive and continuous support services.

4.2 Basic Development Concept and Approach for Planning

4.2.1 Basic Development Concept

The main objective of agricultural development is to improve the current farming systems in the Study area. Such improvement will be carried out by introducing better farm management practices coupled with the provision of agricultural support services. The basic guidelines in planning the agriculture component are defined as follows:

1) Increase the production of paddy rice through the introduction of high yielding varieties and improved farming practices.

2) Increase the productivity and total production of upland crops through the replanting of unproductive coconut trees and promotion of inter-cropping farming systems in the coconut lands.

3) Increase the income of farmers and reduce the risk of economic failure due to crop damages caused by natural calamities. This will be facilitated through the adoption of appropriate farming systems for lowlands and uplands, including crop diversification, multiple cropping and integration of livestock-crop production.

4) Promote a suitable and optimum utilization of the land resource, including the introduction of farming practice for conservation of soil and water resources.

5) Promote the development of agro-processing, handicraft, and marketing activities undertaken by farmers' organization as a mean to achieve the increase and ensure farmers income and employment opportunities in the rural area.

Following the above guidelines, three approaches are being envisaged in developing the agriculture. These are: (i) intensification, (ii) diversification, and (iii) optimization. Intensification will be carried out by improving farm management systems such as the use of better seeds and cautious application of fertilizers and pesticides. Diversification will be implemented by planting perennials and other market-oriented field crops in suitable coconut lands. Optimization will be promoted by crop rotation in paddy fields to increase cropping intensity. These approaches permit the practical way in increasing crop production both in the lowlands and uplands. In addition, the risk of crop failure is expected to be minimized as the farmers would have wider production options.

4.2.2 Approach for Planning

The planning approach for WLIRDP envisages a careful selection of project components taking into consideration the various limitations and constraints which have been earlier identified. The overriding concern is to ensure that there is successful realization of the major objectives of the project with respect to: integrating rural development with the other components of development ; empowering the beneficiaries and establishing local-based institutions to assume critical roles of development management; and eventually increasing productivity and farmers' income. In view of these important objectives, it is felt that a focus, as a matter of strategy, was made as the basic parameter in defining the scale and configuration of the project components, including the beneficiaries. Give this, the following were considered as the planning rationale:

1) Initiation of complementary and critical project components;
2) Recognition of the participation of the beneficiaries;
3) Recognition of the role of the central and local government units; and
4) Establishment of model projects

(1) Initiation of Complementary and Critical Project Components

It is envisioned that only the major components of development will be recommended and pursued. Broadly these will include: (i) construction of an irrigation facility; (ii) construction and rehabilitation of priority rural road network; (iii) construction and improvement of potable water supply, particularly level-II facilities; and (iv) development of agriculture cum provision of necessary support services.

(2) Recognition of the Participation of the Beneficiaries

The success of any viable farming community is contingent on the active participation of the beneficiaries. The confirmation on who among the prospective beneficiaries are willing to participate in the proposed development projects is essential and critical. The identified beneficiaries will form the core of institutional and hardware support under WLIRDP. Over the long-term, these groups are expected to be the agents of change in the Study area.

Apart from the above, there are other activities where participation of the beneficiaries is deemed urgent. These include the provision of basic extension services as farmers' extension agents; and operation and maintenance of facilities constructed under the project, particularly post-harvest equipment, irrigation facilities, etc. To effectively carry out these activities, the beneficiaries should bond themselves into strong and viable farmers' organization because over the long-term they are expected to own and maintain some of the facilities.

(3) Recognition of the Role of Central and Local Government Units

The central and local government units have distinct responsibilities to perform in the project. This is more important for the LGUs, particularly the provincial government of Albay and municipal governments of Camalig and Daraga where the major components of the project are part and parcel of the devolved services. Under this circumstance there should be a mechanism where both the central and local governments can work harmoniously for the successful execution of the project components.

To the extent that the authority clearly belongs to the LGUs, the central or national agencies can only lend technical and financial support to the former. The latter can not exert their superiority over the former. This is the principle being espoused in the local government code. The major roles and responsibilities of the various agencies will be spelled out clearly under the proposed organizational/institutional plan to be prepared in consultation with concerned authorities.

(4) Establishment of Model Projects

The essence of establishing a model project is to ensure that success can be realized, particularly in agriculture and in the promotion of livelihood or income generating endeavors. There are strong arguments in favor of establishing model projects in the Study area. For one, there are limited experiences and resources of the beneficiaries and as such do not warrant the execution of huge and grandiose development activities. It will take a learning process before the beneficiaries and even the institutions can effectively and efficiently manage their activities. Second, it makes it easier to replicate successful activities of the model project to other outlying areas because of scale and magnitude. Such a scale is within the absorptive capacity of the beneficiaries and established institutions.

The model projects will be formulated and designed based on the current farm structure, namely as follows: lowland paddy-based; upland corn-based; and upland coconut-based. The beneficiaries of the model projects will be carefully selected to ensure their complete participation in the planned activities. In addition, the necessary agricultural support services, including the systems and mechanism will be provided. The proposed physical and institutional infrastructure facilities of WLIRDP are dovetailed to cover the requirements of the model projects.

4.3 Basic Agricultural Development Plan

4.3.1 Lowland Development Plan

(1) Cropping Pattern and Farming Practices

Paddy rice is a main crop being produced in the lowlands at present. The stabilization of double cropping and increase its productivity are the twin issues for lowland development. In the future, irrigation water will be supplied to potential paddy field, while some area will be left as rainfed condition. The productivity of irrigated and rainfed paddy fields will be improved as follows:

At present, the harvesting of the first cropping is seriously affected by heavy rains and strong typhoons during the months of October to December. However, improving the supply of irrigation water and introducing earlier maturing varieties can minimize the impact of these damages. The first cropping will be planted in the middle of May to the end of June and is expected to be harvested in the beginning of September to middle of October before the onset of peak typhoons. The second cropping at present needs to be started in November using sufficient rainfall because yield is affected by shortage of rainfall and irrigation water during the month of February. The second cropping in the future could be later started in the beginning of December to prevent plant stress and damages from heavy rains and typhoons.

Under the rainfed condition, advancing the harvesting could increase the production of paddy through decrease in damages by typhoons during the first cropping and shortage of rains during the second cropping. Presently, the prevailing and late maturing varieties such as IR 64 and 68 (115-120 days) need to be replaced with earlier and drought tolerant varieties such as PSB RC 14 (105 days). Timely land preparation is also needed to utilize effectively occasional rainfall. The equipment for land preparation, either draft animals and/or small hand tractors should be made available. The effective procurement and utilization of animal and mechanical powers could be realized through the activation of the cooperatives. The improvement plan for paddy cropping pattern based on probable rainfall with a return period of 5 years is tentatively formulated as follows (Ref. Fig. F.4.1):

	First Cropping Season		Second Cropping Season	
	Planting	Harvesting	Planting	Harvesting
Irrigated	May/Mid- Jun/End	Sep/Beg-Oct/Mid	Dec/Beg - Jan/Mid	Mar/Mid - Apr/End
Rainfed	Jun /Beg - Jun/End	Sep/Mid-Oct/Mid	Dec/Beg - Jan/Mid.	Mar/Mid - Apr/End

Diversified crops such as mungbeans could be introduced in some rainfed paddy field instead the second cropping of paddy. The cultivation of legumes will improve soil fertility and minimize crop failures due to drought. Through the improvement of seed procurement, post-harvest and marketing conditions, diversified crops could be promoted at larger area of existing rainfed paddy. Rotational irrigation system will be the potential instrument for introducing crop diversification during the second cropping season.

Since majority of the prospective beneficiaries do not have experiences on irrigated farming practices for paddy, the extension service must emphasized training on water management at the early stage of project execution. The procurement and distribution of recommended seeds should be provided in an integrated manner. To achieve the target yields, cautious application of fertilizers, intensive control of weeds and pest are necessary. The prevalence of mud snails is a serious problem in rice production. The control of this pest could be partially achieved by proper management of irrigation water. The establishment of a small laboratory for conducting analysis of soils relative to the proper application of plant nutrients is recommended to be included as part of the integrated support services.

The economic life span of the irrigation infrastructure to be provided by the project could be shortened if management of the catchment areas is not implemented appropriately. Most of

the catchment areas of the water sources are being used for agriculture production, mainly coconut plantation. Some steep parts of the catchment areas are inadequately plowed for planting annual crops without applying soil conservation measures. Due attention must be given to the introduction of soil conservation measures in the catchment areas of the proposed dams sites. The development of a demonstration farm to demonstrate appropriate farming practice on steep land is proposed as a project component.

(2) Post-Harvest and Marketing

To improve the post-harvest and market handling for paddy rice, the current services such as short-term credit and transport of paddy rice provided by traders should be tempered. Many farmers get their credit from traders under an arrangement where the former consigns their product to the latter. Most farmers badly need credit for production purposes. The harvests are normally sold to creditors or immediately disposed as wet paddy at very low prices as payment for the loans incurred. Farmers do not have the incentive to improve the quality of paddy rice under the above situation.

Private rice mills are mostly operated in the Study area. The farmers mill paddy rice mainly for home consumption. There are no post-harvest facilities, i.e. thresher, sun-drying floor, warehouse, rice mill, transportation mean, etc. being currently managed by farmers' groups or cooperatives. This is brought about by the lack of technical and managerial skills among farmers to operate such post-harvest facilities.

In view of the above, the supply of institutional credit to organized farmers, mainly for production purposes, is deemed indispensable to create an environment conducive for the development of post-harvest and efficient market system in the Study area. In the lowland, IAs will be organized for the O&M of irrigation facilities. These IAs' comprising of farmers in the Study area and rainfed farmers outside of the project area can be potential members for the cooperatives to provide better post-harvest and market services. In the Model area, it is proposed that the following post-harvest and marketing facilities managed by the cooperatives will be made available based on actual requirements:

1) Mechanical threshers
2) Sun-drying floor and /or mechanical dryer
3) Warehouses for farm inputs and products
4) Trucks for transportation
5) Rice mill and other processing facilities

The above facilities will be introduced gradually based on the progress of cooperative development and absorptive capacity of the members. A weak cooperative with poor management capability and capital will definitely not be able to manage such marketing facilities as warehouse and rice mill.

4.3.2 Upland Development Plan

(1) Land Use Plan

The land use plan for the uplands in the Study area will be formulated based on physical, climatic, and socio-economic considerations. Physical and climatic characteristics, especially lengthy rainy periods and strong typhoons, topography, soil fertility and capability, crop suitability on various soil and land conditions and socio-economic status such as low income level of farmers and high incidence of tenancy will be stressed in defining the limits of optimum land use.

The improvement of the current land tenure system will be one of the most important incentives to improve agriculture production and living condition of farmers in the Study area. The uncertainty about tenurial status among farmers is one of the prime reasons why farmers are reluctant to make productive investments on the coconut areas.

The total area of upland is estimated at around 8,840 ha. Coconut and open lands mainly devoted to corn are estimated at 7,080 ha and 420 ha, respectively. The rest of upland covering 1,340 ha are shrubs and grass lands. About 175 ha of these lands have steep slopes and were previously cultivated. Based on the land capability assessment, around 1,165 ha of shrubs and grass lands are suitable for agricultural production.

Land Use	Area (ha)	(%)
Coconut Land	7,080	80.0
Open Annual Crop Land	.420	4.8
Shrubs and Grass Land	1,340	15.2
Total	8,840	100.0

The suitability classification of upland is shown in the table below. S2 and S3 areas for diversified annual crop production are estimated at around 3,435 ha and 5,205 ha, respectively. On the other hand, S2 and S3 areas for perennial or tree crop production are estimated at 4,470 ha and 4,070, respectively.

Suitability Classification	Diversified Annual Crop (ha)	(%)	Tree Crop (ha)	(%)
Highly Suitable (S1)	0	0	0	0
Moderately Suitable (S2)	3,435	38.9	4,470	50.6
Marginally Suitable (S3)	5,205	58.9	4,070	46.0
Not Suitable (N)	200	2.2	300	3.4
Total	8,840	100.0	8,840	100.0

It is recommended that the present land use pattern for the upland areas be maintained. The present shrubs and grass lands will be utilized for the cultivation of annual crops with the use of proper land and soil management. The opening of coconut land for the cultivation of intensive annual crops, even on slopes of less than 8%, is not recommended. The inter-cropping on the coconut land will be more acceptable compared with open annual crop land. The introduction of soil conservation and improvement of fertility to increase crop productivity will be relatively manageable under the coconut land. And given the predominant tenant and sharing farmers into consideration, inter-cropping has a higher social adaptability than open annual crop. The framework of future land use in the Study area is summarized as follows:

Land Use	Present (ha)	(%)	Future (ha)	(%)
Coconut Land	7,080	80.0	7,080	80.0
Open Annual Crop Land	420	4.8	1,620	18.4
Shrubs and Grass Land	1,340	15.2	140	1.6
Total	8,840	100.0	8,840	100.0

The present practice on upland management in the Study area is recommended to be improved through the adoption of Sloping Agricultural Land Technology (SALT) introduced

by the Bureau of Soil, DA. The appropriate land management system for the promotion of inter-cropping system and soil management of open annual crop land will be formulated according to the present land use, vegetation coverage and land slope as follows:

Present Land Use	Slope Range (%)	Recommended Management
Open Annual Crop Land (Corn Cultivation)	0 - 8	Crop rotation including legumes Mixed cropping system of corn plus legume crop
Coconut Land		
Farm Land	0 - 18	Inter-cropping either annual or perennials crops Mixed cropping
	18 - 25	Inter-cropping of perennials crops
	> 25	Inter-cropping of perennials crops, Mulching
Dam Catchment Area	0 - 18	Perennial crops, Soil conservation, Minimum tillage
	> 18	Agro-forestry, Soil conservation, Zero tillage
Shrub and Grass Land	0 - 8	Convert to annual or perennial crops, Mixed crops
	8 - 18	Contour planting, Alley cropping, Mix cropping
	18 - 25	Inter-cropping of perennials crops, Mixed cropping

(2) Selection of Upland Crops

The selection of upland crops suitable for commercial production, excluding coconut was made following a three-step eliminatory process. Fifty four (54) potential crops commonly grown in the Philippines have been considered for evaluation as shown in Table F.4.1.

1) First screening: Fifty four (54) potential crops were evaluated by crop adaptability to the climate of the area, i.e. temperature, rainfall pattern, frequency of typhoons, and partial shading under coconut plantation, and 27 crops were screened.

2) Second screening: Twenty seven (27) crops were evaluated by adaptability to the types of soils, i.e. soil texture, drainage condition, and soil pH and 18 crops were screened.

3) Third screening: Eighteen (18) crops were evaluated by the financial profitability, marketability, perishability and possibility to contribute to agro-industry development and 15 crops were finally selected.

Based on the above screening, the following crops were selected: upland rice, corn, soybean, mungbean, okra, chili, eggplant, sweet potato, cassava, ginger, papaya, pineapple, abaca, coffee, and black pepper. These 15 crops will be recommended for the development of open annual crop land and promotion of coconut inter-cropping system. Pili nut and other fruit tress will be recommended to be planted on small-scale. The planting materials for ginger and pineapple are expensive hence they will be recommended to be initially planted in small areas for farmers to produce their own seedlings. The agro-forestry species such as Anahaw and bamboo are also highly suitable. Pasture species that can be grown under the coconut trees will be recommended for livestock feeding and soil conservation. These crops will be introduced according to the following land use and soil conservation practice:

Land Use/ (Purposes)	Annual Crop	Perennial Crop
Open Annual Crop Land/ (Commercial Production)	Upland Rice, Corn, Soybean Mungbean, Okra, Sweet Potato	Pili, Papaya
Coconut Land (Commercial Production)	Upland Rice, Corn, Soybean Mungbean, Okra, Sweet Potato, Chili, Eggplant, Cassava, Ginger	Papaya, Pineapple, Abaca Coffee, Black Pepper
Both Land (Soil Conservation)	Soybean, Mungbean	Abaca, Coffee, Pili, Anahow Bamboo, Pasture

(3) Upland Corn Based Development Plan

(a) Soil Conservation and Improvement of Production Infrastructure

The GPEP area planted to corn has been steadily increasing in the Study area. The assistance provided under GPEP for corn covers only supply of hybrid or open pollinated seeds, fertilizers and technical assistance. The upland corn fields in the Study area are not fertile and easily suffers from soil deterioration and erosion. It is reported that some of the open upland corn areas in the province are damaged by soil deterioration and gully erosion because soil conservation measures are not implemented. The upland corn farmers are forced to fallow their land at present. Soil conservation measures for upland corn areas should be introduced for sustainable farming. To increase the productivity of corn and other diversified crops, the improvement of production infrastructure such as soil conservation work covering contour bunds and drainage; farm to village road; and seasonal irrigation water supply will be necessary. The following developments will be made based on the requirements of the area:

1) Formulation of land use and field layout plan based on the slope, soil fertility, present vegetation, degree of soil erosion,

2) Farm bunds, farm drainage and farm road,

3) Nursery for diversified crops and soil conservation perennial crop,

4) Small water impoundment and shallow tube well at a suitable site for the use of farming activities (washing of farm tools, agro-chemical treatment, etc.), irrigation water supply for the nursery and drinking water supply for livestock,

5) Compost producing areas and shed for producing organic manure,

6) Workshop and garage for farm tools, farm machinery, etc.

(b) Improvement of Farming Practices

The present farming management being practiced by corn farmers are rather detrimental to soil fertility and erosion. Many farmers are cultivating hybrid corn but apply small quantity of inorganic fertilizers. The application of organic fertilizers is not common in the Study area.

Corn is one of the nitrogen depleting crops. A shortage of nitrogen nutrient reduces corn productivity. The timing of fertilizer application is important to obtain good harvests. The recommended time of applying nitrogen fertilizer is about 10 days before teaseling. Adequate weeding is essential to minimize fertilizer losses and promote efficient plant growth. Hybrids corn require double amount of fertilizers compared with open pollinated one. Because of the physical and socio-economic constraints of the area, it is recommended to promote planting open pollinated corn.

In the clay soil area extending up to the uplands, the corn fields should be left for a period one or two weeks after plowing to improve the physical condition of soil before planting. Reduced tillage minimizes soil erosion and conserve soil moisture. A balanced application of inorganic and organic fertilizers is recommended to: satisfy the nutrient requirement of the crop; improve soil fertility; and reduce cost of production. The integration of corn and livestock production will be promoted to produce organic manure to be used as fertilizer for the corn field. Crop rotation such as corn-legume-corn will be introduced to improve soil fertility and crop productivity.

To improve corn-based farming on upland, support services in terms of extension on crop husbandry, post-harvest and marketing and credit should be extended in an integrated manner. The procurement of farm inputs such as appropriate seeds, fertilizers and pesticides should be worked out with the supply of credit under closed coordination and arrangement of related agencies such as MAS, DA, and LBP. Intensive guidance will be indispensable to establish appropriate upland corn-based farming system in the Study area.

(c) Selection of the Upland Corn-based Model Area

The Model project approach is proposed to support and promote corn-based upland development in the Study area. The provision of integrated agriculture support services covering extension, procurement and distribution of seeds and other inputs, post-harvest and marketing and credit will be provided to the model area. The model area will be a core for extension of the appropriate upland corn-based farming system. It also functions as a showcase for replication in other areas over the long-term. The criteria for the selection of upland corn-based model area are as follows:

1) The barangay where the model area would be established is one of the main corn production area.

2) The barangay is near to other barangays with large area devoted to corn production.

3) The direct beneficiaries of the model area are organized into a functional corn farmers cooperative or other type of farmers organization.

4) The land area to be used should be classified at least moderately suitable (S2) for intensive production of corn and others diversified crops.

The barangays with large corn areas are San Ramon, Alobo, Mayon, Magogon and Tinago as shown in Table F.4.2 and Fig. F.4.2. About 50 % of the total corn area are located in the barangays San Ramon, Mayon, and Magogon. A corn-based cooperative is existing in barangay Magogon. Based on the above criteria barangay Magogon will be recommended as the site for the implementation of upland corn-based model project.

(4) Upland Coconut Based Development Plan

(a) Major Development Components

Coconut production is the major agriculture activity in the Study area. About 80% of the present agricultural land is devoted to coconut production. The estimated annual production of copra is about 7,000 tons. The average yield of coconut is estimated at one ton/ha, which is lower than the average yield obtained by farmers of entire Albay province, Bicol region, and the country. Out of the total coconut land in the Study area about 2,300 ha need to be rehabilitated because the trees are older than 60 years or have been badly affected by typhoon or diseases. The development frame to promote appropriate upland coconut-based farming system will include:

1) A gradual replanting of the coconut considered unproductive: About 2,300 ha will be rehabilitated. To pursue this, an objective financing scheme will be made available for coconut farmers to cover the cost of coconut replanting. The production and distribution of coconut seedling will be strengthened.

2) Continue and expansion of the coverage of the Small Coconut Farmers Development Project of PCA: At present only a very small number of coconut farmers within the Study area are beneficiaries of this project.

3) Increase the yield of coconut by improving the husbandry practices on the coconut plantations: For this purpose, extension activities on coconut farming will be strengthened.

4) A gradual increase of the land area devoted to inter-cropping farming system under the coconut plantation: To achieve this, integrated agriculture support services will be put in place, including extension service, credit, supply of seeds and planting materials, provision of facilities for post-harvesting handling.

The development of upland coconut-based model area is proposed to be a component to support the development of coconut-based upland agriculture development. The objective of the model area is to provide an example of an integrated delivery of agriculture support services such as improvement of production infrastructure, procurement and distribution of planting material, extension, credit, , post-harvesting and marketing.

(b) Improvement of Farming Practices

Inter-cropping under the coconut plantation is a farming practice highly recommended to intensify and optimize the use of scarce land resources. About 80% of the land area of a coconut plantation is available for inter-cropping. Many crops can perform well under inter-cropping with coconut. The selection of crops suitable for inter-cropping with coconut will be made from the 15 selected crops in together with farmers' preference and land suitability. Abaca is suggested as a major potential crop because of its suitability to the climate, large demand of abaca fiber and its contribution to the development of handicraft industries. The inter-crops and their combination will be formulated concretely through the model project formulation.

The required minimal farming practices for proper husbandry of coconut and inter-cropping are: soil tillage, weed control, thinning, fertilizer application, and replanting. Shallow tillage around the coconut trees stimulates production of new roots. Weed control should be maintained at least one meter radius around each tree by mulching the area with coconut husk and dried weeds. Aside from controlling weed growth, mulching conserve soil moisture. Coconut trees require plenty of light, therefore thinning of coconut trees is recommended for areas where the trees are too close.

The regular application of fertilizer is necessary to obtain satisfactory yield. The application of adequate amount of nutrients have double the yield in some farms of the Study area. Green manure and farm by-products can be used to replace part of the commercial fertilizer requirements. Legume plants can be grown under the coconuts to incorporate their cuttings as green manure.

The replanting of coconut trees should be done when the coconut trees reach the age of 60 years or when affected by disease, etc. It is recommended to undertake replanting in a gradual scale to maintain always some level of productive trees. The area thinned for replanting the coconut trees should be planted to multiple crops.

(c) Selection of the Upland Coconut-based Model Area

The following criteria were applied to select the site for develop as the coconut-based Model area,

1) The barangay where the model area would be established is a major coconut production area.

2) The barangay is near to others barangay with large area devoted to coconut

3) The direct beneficiaries of the model area are organized into a functional coconut farmers cooperative or other type of farmers organization.

4) The land area is at least moderately suitable (S2) for inter-cropping farming system of annuals and perennials crops.

Based on the application of these criteria, barangay San Ramon will be recommended as the appropriate site for the implementation of the coconut-based model project (Ref. Table F.4.3 and Fig. F.4.3).

(5) Post-Harvest and Marketing

The socio-economic status of upland farmers is more inferior than the lowland farmers because of their lower farm income and uncertain tenurial status. The post-harvest and marketing systems for upland agriculture consisting of upland corn and coconut-based farming should be emphasized. The organization of farmers and supply of institutional credit will be necessary for the promotion of intensive upland development. In the Model area, the post-harvest and marketing facilities to be managed by the cooperatives will be given based on actual requirements. Such facilities will also be gradually implemented based on the absorptive capacity of the cooperative members.

Upland Corn Model Area

1) Farm to village road
2) Sun-drying floor and /or mechanical dryer
3) Mechanical thresher
4) Warehouses for farm inputs and products
5) Trucks for transportation
6) Feed mill and other processing facilities

Upland Coconut Model Area

1) Farm to village road
2) Sun-drying floor and /or improved drying facilities
3) Warehouses for farm inputs and products
4) Trucks for transportation
5) Oil mill and other processing facilities

4.3.3 Model Rural Development Project Area

Based on the basic development plan for WLIRDP, the sites for lowland, upland corn and upland coconut-based development models will be selected from the potential areas where

priority components of the project will be implemented. The sites for the respective model projects were identified taking the following factors:

1) Selected priority irrigation development sites,
2) Selected priority upland development sites for corn and coconut,
3) Selected priority rural roads, and
4) Equitable distribution of model sites in Camalig and Daraga municipalities.

The proposed sites for the respective model rural development projects are summarized as follows:

Item	Covering Barangay	
	Camalig	Daraga
Lowland Development		
(1) Dam No.2 Lowland Irrigation	C-15 Comun C-17 Cotmon (C-14 Binitayan)	D-1 Inarado D-6 Alobo D-7 Tabon-Tabon D-11 Burgos
(Watershed Area)	(C-12 Tagoytoy (C-14 Binitayan)	(D-1 Inarado) (Lacog)
(2) Camalig Diversion Dam	C-6 Ilawod C-7 Libod C-8 Ligban C-9 Tagaytay C-10 Gatob	-
Upland Corn Based Development	C-20 Magogon	-
Upland Coconut Based Development	-	D-19 San Ramon

5. LOWLAND MODEL RURAL DEVELOPMENT PROJECTS (CAMALIG DIVERSION AND DAM NO.2)

5.1 The Project Areas

5.1.1 Project Areas and Locations

The Camalig Diversion lowland model area is extended in the flood plain of Ligban river located around one (1) km southwest from Camalig Poblacion. The area is located administratively within Camalig municipality consisting 20 blocks (purok) of 5 barangays, i.e. Ilawod, Libod, Ligban, Tagaytay and Gotob (Ref. Figure F.5.1).

The Dam No.2 lowland model project area is located in flat plain surrounded by small hills which expand about 4 km southwest from Daraga Poblacion. The area is administratively located between the municipalities of Camalig and Daraga covering 21 blocks in 7 barangays, i.e. Binitayan, Comun and Cotmon in Camalig and Inarado, Alobo, Tabon-Tabon and Burgos in Daraga (Ref. Figure F.5.2).

5.1.2 Demography and Social Status

The related blocks of barangays in the model project areas were identified by interviewing the local personnel using the 1/4,000 topographic map and boundary of the irrigation service area. The total population and households staying within the neighboring blocks were considered the direct beneficiaries of the projects. In addition, the rural households in the model project areas were classified into farm and non-farm households. The farm households which include owner, tenant and care-taker (landless laborers temporarily employed) and non-farm households (non-agriculture) were identified through the sample interview survey. The sampling ratios in Camalig Diversion and Dam No. 2 areas were 11% and 17% of the total number of households, respectively (Ref. Table F.5.1). The shares of farm households in Camalig Diversion and Dam No. 2 areas were estimated at 89% and 95%, respectively. The owner farm households were limited at 29% of the farm households in Camalig Diversion area and 33% of the farm households in Dam No.2 area. The rest of the farm households are tenants and care-takers. Majority of the farm households estimated at 67 - 71% do not have lands. Based on the results of the household classification and distribution of beneficiary households in the respective model project areas, the sampling design for the farmers interview survey covering 400 respondents was made (Ref. Table F.5.2). The compositions of the farm households are summarized as follows:

(Unit: %)

Classification	Camalig Diversion Area	Dam No.2 Area
Owner	28.6	32.7
Non-cultivator	4.8	6.4
Cultivator	23.8	26.3
Tenant	56.2	50.7
Lessee	10.5	5.8
Share-Cropper	45.7	44.9
Care-takers	15.2	16.6
Total	100.0	100.0

The 1995 total population and number of households in the Camalig Diversion area were estimated at 5,489 and 1,033, respectively. In the Dam No.2 area, the population was estimated at 4,792 while the number of households was recorded at 961. For both areas, the average family size in Camalig Diversion and Dam No. 2 areas was estimated at 5.3 and 5.0, respectively. The population density in all related barangays was estimated at 7.9 and 4.0

persons/ha for Camalig Diversion and Dam No.2 areas, respectively. The farm population density in the irrigation service areas comprising the related blocks were rather high at 37.6 persons/ha in Camalig Diversion area and 11.5 persons/ha in Dam No.2 area. The demographic features are summarized as follows (Ref. Table F.5.3):

Item	Camalig Diversion Area	Dam No.2 Area	Study Area (41 barangays)
Area (ha)			
Total*	1,083	2,021	10,613
Irrigation service area	130 (tentative)	395 (tentative)	1,350 (all area)
Population (1995)			
All related barangays	8,517	8,113	51,563
Related blocks only	5,489	4,792	51,563
Farm	4,885	4,557	46,407
Non-Farm	604	235	5,156
Household Number (1995)			
All related barangays	1,558	1,604	9,638
Related blocks only	1,033	961	9,638
Farm	918	915	8,674
Non-Farm	115	46	964
Population Growth (%/year) 1980-90*	1.89	1.07	0.74
Family Size (1995)	5.3	5.0	5.3
Population Density(/ha, 1995)			
Total population*/total area	7.9	4.0	4.9
Farm population/paddy field	37.6	11.5	34.4

*: Figures in all related barangays

In 1990, the illiteracy rate of the household population of more than 10 years old was estimated at 2.9% in Camalig Diversion area and 4.8% in Dam No.2 area. These figures were lower than the national average of 6.5% .

The economy of both lowland model project areas is generally dominated by agriculture. The Camalig Diversion area is located near the Camalig Poblacion and readily accessible. The non-farm households (11% of the total in 1995) are gradually increasing in parallel with the on-going urbanization along the national road to the Poblacion.

5.1.3 Land Use and Soil

Camalig Diversion lowland model project area comprises a total of 147 ha, out of which 130 ha are used for rainfed paddy cultivation and 17 ha for residential, roads and others type of build-up area (Ref. Figure F.5.1). The soils of the area are classified as Legazpi series (Entisol). The predominant texture in the top 60 cm depth is sandy loam. The natural soil fertility is moderate with the pH ranging from 6.1 to 7.1. Due to the sandy nature of the soils, paddy rice in this area has been occasionally affected by shortage of water. In addition, the southern pat of the area is periodically affected by flash floods and has very poor drainage condition.

Dam No. 2 lowland model project area comprises a total of 610 ha. Out of the area, 395 ha are used for paddy cultivation, 137 ha for coconut land, 8 ha for annual upland crops, and 70 ha for residential, roads and others type of build-up areas. Some 364 ha of land are rainfed paddy field and only 31 ha are irrigated paddy field (Ref. Figure F.5.2). The soils have clayey texture and moderate to high natural fertility. The land along the Abagao river, the water source of Dam No. 2, is poorly drained and is sometimes affected by flood of short duration.

5.1.4 Land Holding and Tenure

The data on the land ownership records by barangay as of the middle of 1995 were collected from the provincial office of the DAR. The total number of land parcels for paddy rice in the related barangays in Camalig Diversion and Dam No.2 areas are 943 and 1,162, respectively. These were sorted out by name of land owner and eventually reducing the number of records to 713 in Camalig Diversion area and 952 in Dam No.2 area. On the average, an owner has around 1.3 land parcels. The proportion of paddy rice land below 0.5 ha is roughly 70% of the total number of parcels or around 30-40% of the total paddy area. The average land holding size of paddy rice per owner is 0.65 ha in Camalig Diversion area and 0.52 ha in Dam No.2 area. Similarly, the median land holding size of paddy rice per owner is 0.38 ha in Camalig Diversion area and 0.35 ha in Dam No.2 area. The cumulative share of holding area up to the median size is less than 20%. The land holding size of paddy rice in the model project areas is relatively small. This is further unevenly distributed among the land owners (Ref. Table F.5.4).

The land owners' records of paddy rice land holdings in the related barangays were sorted out by family name. The number of records was reduced to 385 in Camalig Diversion area and 520 in Dam No.2 area. On the average, an owner family has around two owners (Ref. Table F.5.5).

Item/Paddy Land		Camalig Diversion Area	Dam No.2 Area	Study Area
Registered Area	(ha)	464	499	1,562
Registered No. of Parcel	(No.)	943	1,162	3,151
Registered No. of Owner	(No.)	713	952	2,519
No. of Owner Family	(No.)	385	520	1,369
Average Holding Size				
Per owner	(ha/owner)	0.65	0.52	0.62
Per owner family	(ha/family)	1.21	0.96	1.14
Median Holding Size	(ha/owner)	0.38	0.32	0.36

5.1.5 Agricultural Production

The cropping pattern of rainfed and irrigated paddy rice is generally determined by rainfall pattern. The present cropping pattern of paddy rice for both lowland model project areas is shown below:

	1 st. Cropping Season		2 nd. Cropping Season	
	Planting	Harvesting	Planting	Harvesting
Paddy	May to July	Sept. to Nov.	Nov. to Jan.	Mar. to April

The yield of paddy rice is rather low and unstable. The average yield of paddy rice in irrigated area is 3.3 and 3.0 tons/ha during the first and second cropping seasons, respectively. In rainfed area, the average yield is 2.1 and 1.7 tons/ha for the first and second cropping seasons, respectively. The annual paddy rice production in Camalig Diversion and Dam No. 2 model area is estimated at 387 and 1,212 tons, respectively (Ref. Table F.5.6). The major causes of low productivity are:

1) Uneven supply of water due to lack of irrigation and drainage facilities;
2) inadequate means for land preparation which prolongs the planting season;
3) low quality of paddy rice seeds;
4) inadequate farming practices such as fertilization weed control, insect and pest control; and

5) lack of past harvest equipment

5.1.6 Post Harvest and Marketing

There are 3 rice mills in Camalig Diversion area (two in Ilawod and one in Libod) and 4 in Dam No.2 area (one each in Comun and Tabon-Tabon and two in Cotmon). The rice mills are privately-owned mainly for custom milling at the rate of ₱ 0.5 to 0.6 /kg of rice. The rice mills are classified as semi-cono producing 6 to 25% of broken rice. The present milling capacities and annual milling quantities are estimated as follows:

Project Area	No. of Mills	Installed Capacity (ton of rice/hour)	Milling* Quantity (ton/year)
Camalig Diversion Area	3	0.20 (1) 0.65 (1) 0.95 (1)	580
Dam No.2 Area	4	0.20 (2) 0.35 (1) 0.65 (1)	490

Every barangay was found out to have a concrete sun-drying floor for drying paddy rice, copra and corn. Some farmers actually own the sun-drying floor. The capacity of the sun-drying floor in the project areas is insufficient to dry the total output. It could cover only the requirements for home consumption. The paddy rice being set aside for home consumption is traded as wet paddy at very low prices.

5.1.7 Farmers' Economy

The main occupation of a household head is either full-time farmer or part-time farmer cum part-time laborer. This accounts for 94% of the total households in Camalig Diversion area and 81% of the total households in Dam No.2 area. Household heads mainly engaged in full-time handicraft area 4% and 9% of the total households in Camalig Diversion and Dam No. 2 model project area, respectively. More than 80% of the housewives are engaged in farming or handicraft in the both areas (Ref. Table F.5.7).

Total income of sampling households ranges from ₱31,500 to 59,400 in Camalig Diversion area and ₱24,800 to 51,700 in Dam No. 2 area. The livelihood of the households is equally dependent on farm and non-farm sources. The main source of farm income is crop sales comprising of 42 to 86% of the total farm income followed by livestock sales and farm labor employment. The main source of non-farm income is city labor employment which accounts for 10 to 66% to the total non-farm income followed by handicraft and loans. The dependence on farm labor is significant among the smaller operating households. The share of farming expenses to the total expenditure ranges from 17% to 29%. Food is a largest expenditure item of about 42% to 67% followed by education and clothing. The annual net reserve becomes larger according to scale of operating size as well as rights of land ownership and ranges from ₱900 for care-takers to ₱5,600 for large scale owner cultivators (Ref. Table F.5.8).

5.2 Constraints and Development Strategies for Lowland Model Rural Development

5.2.1 Constraints

(a) Large proportion of landless farm households (67-71% of total) with minimal involvement in developmental activities. This is a serious problem considering that these groups have practically no tangible assets. Unless drastic measures are

being introduced to bring them into the mainstream of development, they will remain to be impoverished.

(b) Low productivity of paddy rice under rainfed condition. The low yield of paddy rice is brought about by lack of water during the dry season coupled by improper farming practices. This significantly diminishes the income earned by most farmers.

(c) Damages brought about by flood and inundation along the Ligban river in Camalig Diversion area. Flooding affects seriously the hectarage devoted to paddy rice cultivation. Unless this is abated, the potential to increase cropping intensity for paddy rice production is greatly hampered.

(d) Lack of appropriate farming technologies brought about by weak structures and systems of agricultural extension delivery. This is a critical problem as it affects the ability of the farmers to intensify paddy rice cultivation and crop diversification in irrigated lands.

(e) Dormant and inactive farmers' cooperatives. Practically the farmers cooperatives are non-functioning. This is brought about by serious leadership and management problem. The availment of better services by farmers in terms of cheap farm inputs and favorable prices for paddy rice is thus stifled.

(f) Inaccessibility of farmers to formal credit. The inaccessibility to formal credit is largely due to the non-viable farmers' cooperatives supposedly the main conduits for agricultural credit. The farmers' recourse is ultimately the private traders who normally exact exorbitant interest rates(36-60%/annum).

(g) Inadequate support on post-harvest and market activities. This evidenced by the relatively low quality of paddy rice being harvested especially during the rainy season. There is acute lack of good dryers and rice mills. As a consequence, the farm prices of paddy rice are greatly dampened.

5.2.2 Development Strategies

a) Effective and efficient distribution of irrigation water to achieve the maximum potential irrigable area. Water is very scarce, especially in Dam No. 2 area. The only pragmatic way to expand the irrigable area is to introduce the concept of rotational irrigation during the dry season. To be effective, this practice, however, must be collectively decided upon by the farmer beneficiaries, otherwise it will be fraught with technical and operational problems.

b) Mitigation of flood control by providing adequate drainage facilities. Flood control must be abated to prolong the economic life of the irrigation facilities. This can be ensured by constructing appropriate drainage facilities.

c) Provision of appropriate farming technologies and related infrastructures and post-harvest facilities to improve production and marketing activities. Appropriate farming technologies are necessary not only to increase paddy rice production but also to minimize the risk associated with the vagaries of bad weather and other calamity. With improved infrastructure and post-harvest facilities, significant losses during harvesting can also be avoided.

d) Effective rural financial intermediation to expand the business and micro-enterprises activities of farmers' organization. Rural financial intermediation is essential to provide the farmers enough leeway in securing the necessary capital for short and long-term investments. Financial intermediation is not simply credit

delivery. It is a system whereby a variety of credit needs is made available to the farmers to finance not only their farming but also micro-enterprises' needs.

5.3 Agricultural Production Plan

5.3.1 Camalig Diversion Model Project Area

The agricultural development plan for Camalig diversion lowland model area aims to improve the farming practices on paddy production, increase cropping intensity and yield of paddy rice, after the assurance of irrigation water supply and improvement of drainage conditions. Mungbean cultivation is proposed to be introduced in well drained areas after the harvesting of the first paddy rice season. The proposed cropping pattern is rice-mungbean-rice, aiming to attain a cropping intensity of about 235% (Ref. Figure F.5.3). To increase the cropping intensity it is necessary to use hand tractors to intensity land preparation activities. At present about 10% of land preparation is done through the use of hand tractors. It is proposed to increase this coverage to some 30% of land preparation activities.

The recommended farming practices for irrigated paddy rice cultivation are summarized below:

1) Use of certified seeds of rice varieties with short growing period and strong resistance to pest, such as IR 60,
2) Pre-germination treatment of seed,
3) Efficient management of irrigation water,
4) Adequate amount and timely application of fertilizer, and
5) Effective control of insects and diseases, making emphasis on the introduction of Integrated Pest Management and adequate control of weeds.

Paddy rice yields of 5.5 tons/ha in the first season and 5.0 tons/ha in the second season are projected at full project development. The target yield of mungbean is projected at 1.2 tons/ha. The expected annual production of paddy rice and mungbean at full project development are summarized below (Ref. Table F.5.9).

Item	Present/Without Project			With Project			Increment
	1st Cropping	2nd Cropping	Total	1st Cropping	2nd Cropping	Total	
Paddy							
Area Harvested (ha)	114	87	201	130	130	260	59
Yield (ton/ha)	2.1	1.7	1.9*	5.5	5.0	5.25*	3.35
Production	239	148	387	715	650	1,365	978
Mungbean							
Area Harvested (ha)	-	-	-	45	-	45	45
Yield (ton/ha)	-	-	-	1.2	-		1.2
Production	-	-	-	54	-	54	54
Cropping Intensity	88	67	155	135	100	235	80

Note: * Average annual yield

The estimated available labor in the blocks related to each lowland model area is sufficient to cover the labor requirement for the respective paddy field areas.

5.3.2 Dam No.2 Model Project Area

The agricultural development plan including cropping pattern, forming practices, etc. in this area will be essentially similar to that of Camalig diversion area. The projected annual

production of paddy rice and mungbean at full project development are summarized below (Ref. Table F.5.10).

Item	Present/Without Project			With Project			Increment
	1st Cropping	2nd Cropping	Total	1st Cropping	2nd Cropping	Total	
Irrigated Paddy							
Harvested Area (ha)	26	22	48	190	190	280	232
Yield (ton/ha)	3.3	3.0	3.15*	5.5	5.0	5.25*	2.1
Production	86	66	152	1,045	950	1,995	1,843
Rainfed Paddy							
Harvested Area (ha)	313	237	550	205	185	410	(140)
Yield (ton/ha)	2.1	1.7	1.9*	3.0	2.6	2.8*	1.1
Production	657	403	1,060	615	481	1,096	36
Mungbean	-	-					
Harvested Area (ha)	-	-	-	135	-	135	135
Yield (ton/ha)	-	-	-	1.2	-		1.2
Production	-	-	-	162	-	162	162
Cropping Intensity (%)	86	65	151	134	100	234	83

Note: * Average annual yield

5.4 Post Harvests and Marketing Development Plan

5.4.1 Camalig Diversion Model Project Area

Production and marketing center will be established in Camalig diversion lowland model project area in order to promote proper irrigation based farming and post-harvest and marketing activities. The Center will be managed by the Irrigators Service Association (ISA). The location of the center will be along barangay road in Ligban.

The ISA will provide custom services such as land preparation and threshing to the members of the Irrigators Beneficiaries Association (IBA) using hand tractor and thresher. The scale of rice post-harvest facilities will be designed based on: the quantity of paddy rice procured as fees (irrigation service fee; ISF) and (amortization fee; AF) assumed at 5 cavans/ha/year; quantity of custom milling (20% of the future paddy production); and warehousing and marketing services (10%) as shown in table F.5.11. The required capacities of the warehouse, drying floor and rice mill, and number of farm machinery were estimated as follows:

Center Components	Number	Capacity	Area (m^2)
1. Farm Machinery			
Hand-tractor	2	6 HP	
Thresher	2	6 HP	
2. Sun-Drying Floor			560
3. Semi-Mechanical Dryer	1		10
4. Rice Mill	1	0.6 ton/hour	50
5. Warehouse			143
Paddy	1	88 ton/paddy	93
Others			50

The IBA will manage the Production and Marketing Center as shown in Table F.5.12 and provide integrated irrigation farming services to the IBA members covering:

1) O&M of the irrigation and drainage facilities including water management
2) Collection of ISF and AF in kind and amortization business

3) Custom services for land preparation and threshing using introduced hand tractors and threshers and other farming activities

4) Farm input procurement and distribution

5) Paddy drying, milling and storage

5.4.2 Dam No.2 Model Project Area

As in Camalig area, Production and Marketing Centers will also be established in the Dam No. 2 lowland model project area in order to promote proper irrigated based farming and post-harvest and marketing activities. The location of the center will be near the junction of national road and barangay road going to Mabini in Inarado. The required capacities of the warehouse, drying floor and rice mill, and number of farm machinery were estimated as follows (Ref. Table F.5.13):

Center Components	Number	Capacity	Area (m^2)
1. Farm Machinery			
Hand-tractor	4	6 HP	
Thresher	4	6 HP	
2. Sun-Drying Floor			1,360
3. Semi-Mechanical Dryer	1		10
4. Rice Mill	1	1.0 ton/hour	50
5. Warehouse			280
Paddy	1	215 ton/paddy	230
Others			50

The IBA will manage the Production and Marketing Center and provide integrated irrigation farming services to the IBA members same as in Camalig area (Ref. Table F.5.14).

5.5 Crop Budget and Financial Benefit

5.5.1 Camalig Diversion Model Project Area

(1) Crop Budget

The financial crop budgets for irrigated paddy and mungbean production in Camalig Diversion model project area under with project condition were prepared in order to estimate the project incremental benefit on farmer's economy. The crop budgets were prepared making reference to the crop budgets prepared by several agricultural related institutions such as NIA, BPI, DA, and the necessary adjustment were made for the specific condition of the project area. Farm gate prices were taken as an average from October 1995 to June 1996. The crop budget for irrigated paddy and mungbean production are summarized as follows:

Item		Irrigate Paddy Unit	Unit Price	Qty	Amount (Peso/ha)	Mungbean Unit Price	Qty	Amount (Peso/ha)
Gross Icome								
Unit Yield		ton	8,500	5.5	46,750	16,300	1.2	19,560
Produc. Cost					8,150			3,700
Seeds		kg	14.5	40	580	25.0	20	500
Fertilizers	N	kg	17.2	85	1,462	17.2	30	516
	P	kg	15.7	45	707	15.7	18	283
	K	kg	10.0	45	450	10.0	18	180
Insecticides		lit	375.0	1.5	563	522	0.5	261
Hired Labor		man-day	90.0	33	2,970	90	10	900
Machinery								
Land Prepar.	(30%)	ha	1,000	0.3	300	1,000	0.3	300
Threshing		ton	250	1.65	413			
Hired Animal	(70%)	day	50	6.3	315	50	10	500
Miscelaneous	(5 %)				388			164
Net Income					38,600			12,860

(2) Project Benefits

The main benefits will be increase in the production of paddy rice due to higher cropping intensity and better yields. The harvested area devoted to paddy rice will increase from 200 ha to 260 ha. At full project development, the incremental volume of paddy production is estimated to reach 990 tons/year. The cultivation of mungbean to about 45 ha will result in the production of about 55 tons/year. The incremental gross value of production from crop production is estimated at 9.2 million pesos/year. Furthermore, in view of intensified farming activities, additional labor of about 3,800 man-days/year will be generated.

5.5.2 Dam No.2 Model Project Area

(1) Crop Budget

The crop budgets for irrigated paddy and mungbean production in Dam No. 2 model project area are same as those above for Camalig Diversion project area. The crop budget for rainfed paddy production within Dam No. 2 project area is as follows:

Item		Unit	Unit Price	Qty	Amount (Peso/ha)
Gross Icome					
Unit Yield		ton	8,500	3.0	25,500
Produc. Cost					6,220
Seeds		kg	14.5	40	580
Fertilizers	N	kg	17.2	50	860
	P	kg	15.7	22	345
	K	kg	10.0	22	220
Insecticides		lit	375.0	1.0	375
Hired Labor		man-day	90.0	30	2,700
Machinery					
Land Prepar.	(30%)	ha	1,000	0.3	300
Threshing		ton	250	0.9	225
Hired Animal	(70%)	day	50	6.3	315
Miscelaneous	(5 %)				296
Net Income					19,280

(2) Project Benefits

The primary benefits will be increase in the production of paddy rice due to improved cropping intensities and higher yields. The harvested area devoted to paddy rice will significantly increase from 598 ha to 770 ha. At full project development, the total volume of incremental paddy production is estimated at about 1, 900 tons/year. The cultivation of mungbean to about 135 ha will result in the production of about 160 tons/year. The incremental gross value of production from crop production is estimated at about 18.6 million pesos/year. In addition, labor from farming will increase due to intensified activities. The additional farm labor is estimated at 8,200 man-days/year.

6. UPLAND MODEL RURAL DEVELOPMENT PROJECTS (MAGOGON AND SAN RAMON)

6.1 The Project Areas

6.1.1 Project Areas and Locations

The upland model project areas are located in rolling hill areas, about 2 to 3 km from the national road connecting Daraga and Putiao. The areas are administratively located at barangay Magogon for the corn-based model and barangay San Ramon for the coconut-based model (Ref. Figure F.6.1 and F.6.2). The Magogon and San Ramon areas comprise three (3) and six (6) blocks, respectively.

6.1.2 Demography and Social Status

The rural households in the project areas were classified into farm and non-farm households. The farm household was further classified into owner, tenant and care-taker (landless laborers temporarily employed). Complete enumeration was employed in the conduct of farm household survey in Magogon. In the San Ramon upland model area only 38% of the farm household was surveyed(Ref. Table F.5.1). The shares of farm household in Magogon and San Ramon areas were 94% and 96%, respectively. About 43% and 41% of the farm household in Magogon and San Ramon areas, respectively are considered owner farm households. The inequity in land distribution shows that more than half of the farm households (57-59%) do not have lands. The compositions of the farm household is summarized below:

(Unit: %)

Classification	Magogon Area	San Ramon Area
Owner	42.5	40.8
Non-cultivator	0	11.8
Cultivator	42.5	29.0
Tenant	35.9	51.6
Lessee	4.2	7.5
Share-Cropper	31.7	44.1
Care-takers	21.6	7.6
Total	100.0	100.0

The 1995 total population and number of households in Magogon area were estimated at 496 and 127, respectively. In San Ramon area, the total population and households were calculated at 1,337 and 257, respectively. The average family size was 3.9 in Magogon area and 5.2 in San Ramon area. The population density was estimated at 2.1 and 1.7 persons/ha, respectively. The demographic features for both areas are summarized below (Ref. Table F.5.3):

Item	Magogon Area	San Ramon Area	Study Area (41 barangays)
Area (ha)	240	785	10,613
Population (1995)	496	1,337	51,563
Farm	469	1,282	46,407
Non-Farm	27	55	5,156
Household Number (1995)	127*	257	9,638
Farm	120	246	8,674
Non-Farm	7	11	964
Population Growth (%/year) 1980-90*	-1.81	-0.13	0.74
Family Size (1995)	3.9*	5.2	5.3
Population Density(/ha, 1995)			
Total population*/total area	2.1	1.7	4.9

*: Based on the barangay census.

In 1990, the illiteracy rate of the household population of more than 10 years old for both areas was estimated at 3.2% in Magogon and 2.8% in San Ramon. These figures are lower than the national average of 6.5% .

The economy of the upland model project areas is generally dominated by agriculture, especially production of copra and corn. With the exception of copra drying, there are virtually no agricultural processing factory. The handicraft business, using abaca and other plant materials, is being done by rural women in the both areas. It is one of the significant sources of cash income among the rural folks.

6.1.3 Land Use and Soil

The Magogon upland model project area comprises the entire barangay of Magogon with a total land area of 240 ha. Out of the 240 ha, about 190 ha or 79.2% is planted to coconut. About 20 ha of open land is under upland crop cultivation, mainly corn and 17 ha are fallow land covered by shrubs/grasses. The paddy fields are located on the bottom of the valley and cover 5 ha of the total area (Ref. Table F.6.1). Some coconut lands are inter cropped with upland crops. It is estimated that only 10% of the coconut lands is inter cropped with other crops.

The San Ramon upland model project area is similar to the Magogon area in terms of topography and land use. Out of the total area of 785 ha, the coconut field covers 534 ha; paddy field, 21 ha; upland crop field, 130 ha; fallow land, 84 ha; and the rest is residential and miscellaneous area (Ref. Table F.6.1). Coconut lands inter cropped with annual crop are scattered along this area.

In the upland model project areas, the upland crop field is laid fallow after a few years of cultivation due to decline in soil fertility. It is observed that the major cause of the rapid reduction in soil fertility is the continuous cultivation on sloping land without proper soil conservation practices.

6.1.4 Land Holding and Tenure

The total number of agricultural land parcels was recorded at 201 in Magogon area and 489 in San Ramon area. These records were sorted out by name of land owner and eventually reduced the number of records to 149 in Magogon area and 313 in San Ramon area. On the average, an owner has around 1.3 land parcels in Magogon area and 1.6 in San Ramon area. The number of coconut land parcels below one(1) ha is roughly 50% or around 16-29% of the total coconut area. The average agricultural land holding size per owner is 1.54 ha in Magogon area and 2.58 ha in San Ramon area. The median size of coconut land holding per owner is 1.00 ha in Magogon area and 1.15 ha in San Ramon area. The cumulative share of

coconut land holding up to the median size is estimated at 21.8% and 11.0%, respectively (Ref. Table F.5.4).

The landowners' records of agricultural land holdings were sorted out by family name. This reduced the number of records to 74 in Magogon area and 126 in San Ramon area. On the average, an owner family has around two owners (Ref. Table F.5.5).

Item/Agricultural Land Total		Magogon	San Ramon	Study Area
Registered Area	(ha)	229	807	10,177
Registered No. of Parcel	(No.)	201	489	11,578
Registered No. of Owner	(No.)	149	313	7,831
No. of Owner Family	(No.)	74	126	-
Average Holding Size				
Per owner	(ha/owner)	1.54	2.58	1.30
Per owner family	(ha/family)	3.09	6.40	-
Median Holding Size/Coconut land	(ha/owner)	1.00	1.15	0.73

The DAR has initiated the transfer of coconut land over 25 ha in the Study area and areas above the retention limit of 5 ha. In San Ramon area, the DAR has implemented a coconut land transfer program under the VOS scheme covering around 80 ha. Of the two lots, the distribution of one lot of 44 ha was officially completed through the issuance of a mother CLOA. The remaining lot is now under processing for valuation by the LBP and eventually to be distributed (Ref. Table F.6.2) by the DAR.

6.1.5 Agricultural Production

For both Magogon and San Ramon upland model project areas, the average yield of copra is about 1 ton/ha. The coconut fields are poorly maintained and farmers do not apply fertilizers. About 35% of the farmers cultivate small areas of rainfed paddy rice. Some 65% of the farmers in Magogon and 45% in San Ramon upland model project areas cultivate corn either in open lands or inter cropping under coconuts. Almost all corn growers follow the corn-fallow-corn cropping pattern. Carabao is the only means for land preparation.

More than half of the farmers use hybrid seeds provided by dealers or purchased in the market, while the rest use corn from the previous harvest and seeds provided under the GPEP. The application of fertilizer and pesticides is a common practice, although the amount used is relatively small. Corn farmers apply between 17 to 25 kg/ha of N, and 8 to 12 kg/ha of both, P and K. The average yield of corn in the area is 1.5 and 1.0 tons/ha for the first and second cropping seasons, respectively. The estimated total annual production of corn is about 100 tons in Magogon and 484 tons in San Ramon (Ref. Table F.6.3).

6.1.6 Post Harvest and Marketing

The Magogon and San Ramon upland model project areas are located in remote places. Accessibility is difficult due to poor road conditions. The farmers in both project areas pay an additional transport cost for farm inputs and outputs.

Dried corn with cob is manually threshed using nails fixed on wood. This threshing work is mainly done by women. Threshed corn grains are dried again on the concrete floor or fishing net, bamboo and pandan mat.

The matured coconuts are harvested using a bamboo pole with a scythe at the top. Coconuts being dropped from the trees are collected, piled and dehusked. The dehusked coconut (copra with shell) is divided into two parts before it is being dried. First, the copra with shell

is dried on bamboo nodes. The dried copra with shell is scooped out from the shell. The shelled copra is again dried using sun drying or smoke-kiln method. Most copra drying facilities in the model areas are direct smoke dryers owned by individual coconut farmers. There are no facilities being jointly used by farmer groups or cooperatives. Harvesting to drying are often done by care-takers living in the barangays. The prevailing labor rates for services such as picking and drying are summarized as follows:

Work Item	Wage Rate (₱)	Unit
Picking nuts	0.15	Per nut
Hauling from field to drying place	0.05-0.10	Per nut
Dehusking to drying	0.07	kg of copra

The trading of corn and copra in both upland model project areas is dominated by private dealers. The Magogon Farmers' Multipurpose Cooperative Incorporation (MFMCI) is responsible for trading more than half of the corn produced in Magogon area. The corn grains collected from the farmer members are sold to SADOPECO which operates feed and rice mills in Santo Domingo. Last year, the MFMCI traded around 30 tons of corn grains at a farm gate price between ₱ 6.30 and 7.50/kg which was higher than the prevailing price of ₱ 6.2/kg. The MFMCI slaps a service charge of ₱ 0.1/kg of corn grains for the cooperative's management and members' capital build-up.

6.1.7 Farmers' Economy

The main occupation of household heads is full time farmer or part time farmer cum part time labor which account for 82% in Magogon area and 74% in San Ramon area. Household heads mainly engaging in full time handicraft are 14% and 15%, respectively. The share of housewives engaging in farming or handicraft is 46% in Magogon area and 74% in San Ramon area. Other main occupation of housewives is sari-sari store keeping which accounts for 5% and 9% in the respective area. Full time housewives account for 44% and 15%, respectively (Ref. Table F.5.7).

Total income of sampling households ranges from ₱34,200 to 77,300 in Magogon area and ₱38,500 to 60,200 San Ramon area. The livelihood is primarily dependent on farming, with coming from livestock sales, crop sales and farm labor employment. The main source of non-farm income is city labor employment which accounts for 28% to 100% to the total non-farm income. The share of farming expenses to the total expenditure ranges from 9% to 37%. Food is a largest expenditure item at 36% to 73% of total expenditures followed by education and clothing. The annual net reserve becomes larger according to scale of operating size as well as rights of land ownership and ranges from ₱2,800 for care-takers to ₱8,200 for large scale owner cultivators (Ref. Table F.5.8).

6.2 Constraints and Development Strategies for Upland Model Rural Development

6.2.1 Constraints

(a) Limited farm opportunities. This is brought about by the extreme dependence of farmers on coconut and corn farming. There are no other farming alternatives, hence employment opportunities among the adults and the youths as well are virtually negligible.

(b) Inaccessibility of remote barangays. The inaccessibility of remote barangays is mainly due to the deteriorating conditions of existing rural roads. This in itself creates disincentive for farmers to improve their farming activities because they can hardly transport their farm produce at reasonable transport rates.

(c) Predominant proportion of landless farmers. This observation is similar to the case in the lowland. Around 57-59% of total farm households belongs to this category. Without drastic measures to bring these groups into the mainstream of development, they will always be in dire poverty. It should also be emphasized that CARP lands for immediate distribution are not that abundant in the upland.

(d) Lack of appropriate farming technologies and marketing efforts. This is due to the weak system of agricultural extension delivery. As a result, the farming is very traditional monoculture.

(e) Serious soil erosion. The problem of soil erosion is aggravated by the continuous cultivation of corn coupled by the loss of cover grasses to prevent removal of top soil. If this is not mitigated, the current arable lands will be rendered useless as productivity will be completely lost.

6.2.2 Development Strategies

(a) Establishment of ecologically sound and sustainable farming. To preserve the remaining productivity potential of the upland, appropriate farm practices will have to be introduced. This calls for planting legumes and preferably alternately cultivated with corn. In addition inter-cropping under coconut areas with suitable tree crops(e.g. coffee, pili, etc.) should significantly improve the vegetative cover of the uplands.

(b) Provision of infrastructure facilities to closely link production and marketing activities. Necessary facilities to improve current farm production such as nursery, soil conservation work, and water impoundment are essential to diversify the existing farm production. This activity, must, however, be accompanied with appropriate marketing support such as post-harvest facilities and tie-up with credible marketing institutions to ensure favorable marketing margins to the farmers.

(c) Formation of landless organizations. The organization of the landless families into a viable institution to perform related farming services such as operation of nursery, post-harvest equipment, handicraft center, and cultivation of coconut lands under absentee land ownership, offers the best practical route to involve such group into the development process. To do so is tantamount to generating employment opportunities which is critically not available in the upland today. This strategy is fundamental to the operationalization of the so-called social reform agenda.

(d) Establishment of CARP beneficiary organization. The formation of CARP beneficiaries into cohesive and collegial organization is fundamental to ensuring the efficient and effective operation of their farm lands. The support services to be given to them necessitate joint and collective management so as economies of scale can be achieved.

(e) Delivery of agricultural support services under the concept of "nucleus" approach. This strategy is essential given the extreme difficulty of providing such services to individual farmers(see discussion in 3.4). Individually, the resources committed to improve their livelihood and farming activities will be thinly spread out over a number of small farmers. As a consequence, this will not give the desired impact of development. To reverse this situation, collective approach is being recommended.

6.3 Agricultural Production Plan

6.3.1 Magogon Model Project Area

The agriculture development plan for Magogon upland model area aims to:

1) Increase the yields and total production of corn and coconut through the improvement of farming practices, such as land preparation, fertilization, pest control, replanting coconut trees of low productivity, etc.;

2) Diversification of agriculture production through the planting of mungbean in corn areas, inter cropping of coffee and pili under the coconut areas, and the introduction of poultry to be managed by the existing cooperative.

The land use plan for Magogon upland model area is summarized below (Ref. Figure F.6.3).

(unit: ha)

Land Use	Present/Without Project	With Project Condition
Coconut land	186	185
coconut only (without inter cropping)	166	129
inter-cropping with corn	20	19
inter-cropping with coffee, pili	nil	37
Open land	37	34
upland crops	20	34
grass/shrub	17	0
Protected marginal land	-	3
Rainfed paddy field	5	5
Existing railroad project of PNR	4	4
Others (residential, roads)	8	9
Total	240	240

The proposed cropping pattern for annual crops is corn-mungbean-corn (Ref. Figure F.6.4). Particular emphasis will be placed on the promotion of better land management including soil conservation measures to restore soil fertility. Integrated pest management concept will be among the main subject for agricultural extension activities in the corn-based model area.

A demonstration farm will be established for the extension service to introduce appropriate farming practices. A nursery for propagation of coconut, coffee, and pili seedlings will be established in the nucleus facilities. The target area for replanting coconut trees is estimated at 47 ha. The area proposed for planting coffee and pili (as permanent shade tree) is estimated at 37 ha. The target areas for coconut replanting and coffee/pili planting will be completed in a period of about 7 years from project initiation (Ref. Table F.6.4).

The estimated crop production in Magogon upland model area at full project development is summarized as follows (Ref. Table F.6.4).

Crop	Present/Without Project			With Project Condition		
	Harvested Area (ha)#1	Yield (ton/ha) #2	Production (ton/year)	Harvested Area (ha)#1	Yield (ton/ha)#2	Production (ton/year)
Coconut	186	1.0	186	185	3.5	648
Corn	84	1.2	99	108	2.8	308
Paddy rice	10	1.9	19	10	2.8	28
Mungbean	-	-	-	54	1.2	65
Coffee	-	-	-	37	1.5	55
Pili	-	-	-	37	2.0	74

#1 Two cropping seasons #2 average annual yield

The proposed poultry farm of the existing cooperative will be under a contract growing scheme with poultry integrators. The integrator will provide the chicks, feeds, and medicines, while the farmers will provide the labor and infrastructure facility. It is proposed to initiate the scheme with 5,000 chicks per growing cycle.

6.3.2 San Ramon Model Project Area

The agriculture production plan for San Ramon Upland Coconut-based Model area aims to: 1) increase the yield of coconut through a gradual replanting of coconut trees of low productivity and improvement of husbandry of coconut plantations; and 2) promotion of abaca production, as inter-crop under the coconut lands and in open lands.

The land use plan for San Ramon upland model area is summarized below (Ref. Table F.6.5 and Figure F.6.5).

(unit: ha)

Land Use	Present/Without Project	With Project Condition
Coconut land	534	529
coconut only (without inter cropping)	481	183
inter-cropping with annual crops #1	53	29
inter-cropping with abaca, pili	nil	317
Open land	214	210
annual upland crops	130	20
perennial upland crops (abaca, pili)	nil	190
grass/shrub	84	0
Protected marginal land	-	7
Lowland rainfed paddy field	21	21
Existing railroad project of PNR	4	4
Others (residential, roads, etc.)	12	14
Total	785	785

#1 At present the annual crop is mostly corn, with project condition corn will be excluded

The initial project activities will concentrate on an area of about 81 ha presently in process of land distribution under the CARP. Demonstration farm and nurseries are proposed to be established in this lot for the propagation of seedlings of coconut, abaca, and shade trees. The area will also be used to demonstrate the cultivation of abaca (Ref. Figure F.6.6). The proposed cropping pattern for San Ramon model area is shown in Figure F.6.7.

Coconut trees of low productivity will be replanted. The preferred coconut varieties for replanting will be the hybrid PCA 15-1 and 15-2. Abaca is strongly recommended for inter cropping with coconut as well as in the existing open lands. The cultivation of corn will be limited in a radius of 500 meters from the areas devoted to abaca, to avoid possible transmission of diseases to the abaca plantations. Special attention will be given to proper farming practices for both, coconut and abaca to attain high yield. The anticipated crop

production in San Ramon upland model area at full project development is summarized as follows (Ref. Table F.6.6).

Item	Present/Without Project			With Project Condition		
	Harvested Area (ha)#1	Yield (ton/ha) #2	Production (ton/year)	Harvested Area (ha)#1	Yield (ton/ha)#2	Production (ton/year)
Coconut	534	1.0	534	529	3.5	1,850
Corn	400	1.2	480	0	-	0
Paddy rice (Upland)	nil			70	2.0	140
Mungbean	-	-	-	49	1.2	59
Eggplant				15	7.0	105
Abaca	-	-	-	507	2.6	1,318
Pili	-	-	-	190	2.0	380

#1 Two cropping seasons #2 average annual yield

6.4 Post Harvest and Marketing Development Plan

6.4.1 Magogon Model Project Area

The nucleus facilities will include post-harvest, marketing, handicraft sub-center, poultry cage for broiler and nursery for producing seedlings of coffee, coconut and pili as a shade tree. The facilities will be operated by the Magogon Farmers Multipurpose Cooperatives. The location of the facilities is in the barangay center along the bagangay road from Magogon to Panoypoy. The proposed components and their capacities were formulated on the basis of the production plan as follows (Ref. Table F.6.7):

Center Components	Number	Capacity	Area (m^2)
1. Sun-Drying Floor	1		380
2. Semi-Mechanical Dryer	1		10
3. Processing Facility			
Corn sheller	1	0.5 ton/hour	
Coffee dehuller	1	0.2 ton/hour	
Feed mill	1	0.5 ton/hour	
Rice mill	1	0.2 ton/hour	
4. Warehouse	1		163
Corn/Coffee		125 ton/paddy	113
Others			50
5. Poultry Cage	1	5,000 birds	47
6. Handicraft Sub-Center	1		50
7. Nursery	1	(40 x 25 m)	1,000

Corn grits and rice bran will be used for poultry farming. The cooperative could sell corn grits instead of corn grain to Santo Domingo Peoples Cooperatives. Under contract growing scheme, broilers will be purchased by the San Miguel Corporation or Swift Corporation which have poultry dressing plants in Anislag and Libod, respectively. The coffee beans will be sold directly to the buying station in Legazpi city under the Nestle Philippine Inc. (Ref. Table F.6.8).

6.4.2 San Ramon Model Project Area

The nucleus facilities will be made in the production farm (7.0 ha) and nucleus farm (1.4 ha), respectively and include a nursery for propagating seedlings of abaca, coconut and pili as a shade tree; organic fertilizer house (only at the production farm); abaca stripping house; fiber classification and warehouse; handicraft center at the production farm and sub-center at the

nucleus farm. These facilities at the production farm will be managed by the Association of landless farmers in barangay San Ramon, while the nucleus farm will be managed by the CARP beneficiaries association involving 26 farmers. Each association will be full-fledged as cooperatives in the future. The proposed facilities and their capacities were formulated on the basis of the production plan as follows (Ref. Table F.6.9):

Center Components	Number	Capacity	Area (m^2)
I. Production Farm (7.0 ha)			
1. Organic Fertilizer House			
Building	1		65
Coconut husk crasher	2	63.0 kg/hour	
2. Stripping House			
Building	1		80
Defibering machine	1	12.5 kg/hour	
Spindle stripping machine	8	10.0 kg/hour	
Engine	2	4.5 HP & 23.0 HP	
3. Fiber Classification and Warehouse			
Building	1		90
4. Handicraft Center and Office			
Building			230
Weaving loom	12		
Sewing machine	4		
Heavy-duty sewing machine	1		
5. Workshop			
Building	1		25
Hand-tractor	1	10 HP	
6. Nursery			
Abaca seedbed			3,000
Shade trees/coconut			7,000

Center Components	Number	Capacity	Area (m^2)
II. Nucleus Farm (1.4 ha)			
1. Stripping House			
Building			40
Defibering machine	1	12.5 kg/hour	
Spindle stripping machine	4	10.0 kg/hour	
Engine	2	4.5 HP & 12.0 HP	
2. Fiber Classification and Warehouse			
Building	1		90
3. Handicraft Sub- Center			
Building			65
Weaving loom	4		
Sewing machine	1		
Heavy-duty sewing machine	1		
4. Nursery (0.3 ha)			
Abaca seedbed			1,000
Shade trees/fruit trees/coconut			2,000

The production farm will be utilized as a supply center of seedling for abaca, shade trees, and coconut to cover the entire San Ramon area and neighboring barangays in the future. The nucleus facilities at the production farm will function as extension center for abaca production and processing technologies including handicraft manufacturing. The distribution of seedling with organic fertilizer and planting of abaca with proper upland farming technologies will be made by the landless farmers association. The abaca stripping and classification services to the abaca producers and enhancement of handicraft manufacturing will also be promoted. In the future, the landless association managing the production farm

will accumulate capital to pay amortization and use for other agri-business investments. The establishment and management of the production farm will be a key factor for the active participation of landless farmers in the project. This is estimated represent around 60% of the farm household in the area.

On the other hand, the nucleus farm will be a model for upland coconut-based abaca farming to be managed by the CARP beneficiaries and owner-cultivators. Collective ownership of the nucleus farm covering nursery, demonstration farm and facilities will provide a suitable condition for the formation and strengthening of farmer organizations. Effective dissemination of technology among them is expected to be facilitated (Ref. Table F.6.10 to F.6.12).

6.5 Crop Budget and Financial Benefit

6.5.1 Magogon Model Project Area

(1) Crop Budget

The financial crop budgets for coconut, coffee, pili, and poultry production in Magogon upland model project area under with project condition were prepared in order to estimate the project incremental benefit on farmer's economy. The crop budgets were prepared making reference to the crop budgets prepared by PCA and BPI, and the necessary adjustment were made for the specific condition of the project area. Farm gate prices were taken as an average from October 1995 to June 1996. The crop budget for coconut, coffee, and pili are presented in Table F 6.13.

(2) Project Benefits

The main benefits will be increases in the production of copra, coffee, pili and corn which is a major annual crop. The increases, especially in coconut will be due mainly from better farming practice, replanting old coconut trees, and inter-cropping. The current area of coconut land of 186 ha will be intensively cultivated with other tree crops and field crops. The annual production from coffee and pili is estimated at 55 tons and 75 tons, respectively. Corn production will significantly increase from 100 tons to about 308 ton. The incremental gross value from crop production is estimated at 9 million pesos/year. Poultry production, as a supplementary farming activity, is expected to generate gross earnings of about 200 thousand pesos/year. Over-all, the additional farm labor to be generated from these intensified farming activities is estimated 14,500 man-days/year.

6.5.2 San Ramon Model Project Area

(1) Crop Budget

The crop budgets for coconut and pili production in San Ramon model project area are same as those above for Magogon project area. The crop budget for abaca production is included in Table F 6.13.

(2) Project Benefits

The main benefits will be increases in the production of tree crops and field crops due to expansion on inter-cropping area and improved farming activities. The current area of coconut land of 530 ha will be intensified with the cultivation of high value crops, notably abaca, pili and other field crops. The annual additional production of coconut, abaca, and pili is estimated to reach 1,300 tons, 1,320 tons and 380 tons, respectively. The annual

incremental gross value of production of these crops is placed at 60.5 million pesos. Furthermore, in view of the intensified farming activities, the additional farm labor that will be generated is placed at about 115,000 man-days/year.