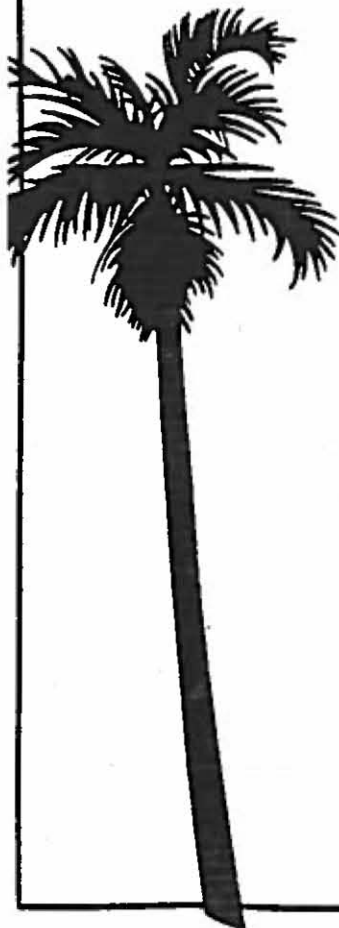




I Tano'-ta The Land Use Plan for Guam



PREPARED FOR
The Territorial Planning Council

**FINAL
LAND USE PLAN**

W. B. FLORES & STRATEGIC PLANNING GROUP

A Joint Venture

I TANO'-TA
THE LAND USE PLAN FOR GUAM

FINAL LAND USE PLAN

May 1994

Prepared for:

THE TERRITORIAL PLANNING COUNCIL

Submitted By:

W.B. FLORES & ASSOCIATES/STRATEGIC PLANNING GROUP, INC.
A Joint Venture

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FINAL LAND USE PLAN

OVERVIEW

PURPOSE

I Tano'-ta: The Land Use Plan for Guam provides the framework to manage the growth and development of the Territory of Guam. Its purpose is to guide development in a coordinated and harmonious manner which will permit the timely provision of adequate community services, protect the delicate ecological balance between the natural and man-made environments and promote the health, safety, convenience, prosperity and general welfare of Guam's citizens and visitors.

BACKGROUND

Guam has experienced significant growth in its population since the 1960s. During the last 30 years, citizens of the Territory have witnessed changes to their quality of life, including an increase in the number and range of employment opportunities and the standard of living for many residents. However, other impacts have contributed to the lessening of some aspects of the quality of life. For example: the complex interrelationships of increased traffic congestion; the rising cost of housing, food, and other living expenses; rapid development of land, all associated with a significant loss of environmentally sensitive areas and open space, degradation of water quality, and the rapid development of the Territory's remaining beaches.

In 1990, the Twentieth Guam Legislature, in response to the impacts of rapid growth passed Public Law 20-147, a mandate for the development of a comprehensive plan. The comprehensive plan will provide long-range guidance for the physical, economic, and social development of the Territory.

In retrospect, the Territory's past planning efforts began in the 60s. The creation of the Master Plan in 1966, the development of various more specific land use plans (1977, 1978 and 1984), surveys, public workshops, and public hearings all indicated a strong desire by the residents of Guam to put into place policies for the orderly development of the island.

Unfortunately, many of the plans and recommendations completed since the 1966 Master Plan were not implemented. The economic growth in an environment without adequate planning controls brought forth unwanted impacts: traffic jams, inadequate infrastructure, increased air and water pollution, diminished recreational opportunities, rising land values and shortages of affordable housing.

The Twentieth Legislature anticipated the worsening impacts of unplanned growth in the findings of the need for Public Law 20-147, in which they have stated:

"Many are concerned about lack of clear and decisive direction that has caused both social and economic development to occur at levels which the island may not be able to physically and infrastructurally sustain throughout the forthcoming decade.

What is being indirectly conveyed to island leaders is a simple but nevertheless important sense that there must be 'appropriate limits set for social, economic and physical growth', limits that would not threaten the continued livelihood of the island and her people. How can or should this be done?

The foundation for desirable growth and development stems from essential land-use decisions. Guam is forced at the present time to allow or disallow development, using a land-use plan adopted in the mid-1960s. While this plan met the needs of past development trends and characteristics, it is found to be grossly lacking for today's purposes. It is for this precise reason that the Territorial Land Use Commission has not been able to effectively address development issues and matters falling under its purview. An island-wide comprehensive development plan is needed and needed now."

I Tano'-ta: The Land Use Plan for Guam is one of sixteen elements of the Guam Comprehensive Development Plan, mandated by Public Law 20-147 in March 1990. In addition to the Land Use Plan, the Guam Comprehensive Development Plan, GCDP mandates that future plans be created to address a wide range of government services and public issues affected by growth in the Territory, including: community design, transportation, regulations, public facilities, public lands, public buildings, housing, redevelopment, conservation, recreation, safety, tourism, development policy, capital improvements, and public policy statements. All of these elements are intended to help guide Guam's future growth into the 21st century. That same law also created the Territorial Planning Council to oversee development of the GCDP. The members of the Territorial Planning Council, as designated by PL 20-147, include:

Territorial Planning Council Members

Charles P. Crisostomo, Chairman

Fred M. Castro, Vice Chairman

Mike Cruz, Acting Executive Secretary

The Honorable Edward Reyes, Senator, 22nd Guam Legislature

The Honorable Anthony Blas, 22nd Guam Legislature

The Honorable Vicente Pangelinan, 22nd Guam Legislature

The Honorable Vicente C. Bernardo, Mayor of Yona
Frank L. G. Castro, Department of Land Management
Peter R. Barcinas, Department of Commerce
Joey C. Cepeda, Guam Visitors Bureau
Chris K. Felix, Chamber of Commerce
Lourdes P. Aguon, Member-at-Large
Marcel G. Camacho, Executive Assistant

Former members of the Territorial Planning Council who participated in the development of the Land Use Plan include: Peter P. Leon Guerrero, Bureau of Planning , Senators Frank R. Santos, Gordon E. Mailloux and Martha C. Ruth of the 21st Guam Legislature.

I Tano'-ta: The Land Use Plan for Guam is the pivotal element of The Guam Comprehensive Development Plan. As Governor Joseph Ada indicated at the outset of the Plan's development: "The Plan will be our guide as to how, when and where we grow, and develop from now to the year 2015."

ORGANIZATION

Planning is a process. The development of I Tano'-ta: The Land Use Plan for Guam has been a cooperative effort between the Territorial Planning Council (TPC), its consultants, numerous government agencies, and many individuals who comprised the Community and Technical Advisory Committees. A Land Use Plan is a comprehensive, coordinated, and continuing program, the purpose of which is to help public and private decision makers arrive at decisions that promote the common good of society. The Plan includes:

- (1) Identification of problems;
- (2) Research and analysis to provide definitive understanding of these problems;
- (3) Formulation of goals and objectives to be attained in alleviating these problems;
- (4) Development and evaluation of alternative plans to attain the agreed-upon goals and objectives;
- (5) Recommendation of appropriate courses of action from the alternatives; and
- (6) Implementation of the approved plan and program.

Land use planning is more than merely specifying where particular uses (i.e. low-density housing, hotels, business, offices, etc.) are to be located. It entails addressing what is needed to support that development, whether it be adequate roads, public water and sewer systems, or other public services such as recreational facilities, public transit, or health care facilities.

The flow chart indicates the first phase of the planning process involves the collection and analysis of data in the areas of environmental affairs, land use, transportation, public facilities (schools, health care, public safety, etc.), public services (potable water, sanitary sewer, solid waste disposal), historical and archaeological sites, physical considerations (steep slopes, flood plains), and historical growth patterns. These efforts culminated in the development of the Land Use Plan: Technical Report I (Inventory and Analysis of Existing Conditions). This report represents an inventory of existing conditions affecting the natural and social environment in Guam. This report also served to highlight the major problems affecting the quality of life on the island.

The second major phase of the planning process involved the creation of alternative concept plans, each providing a different perspective on what Guam might look like in the year 2015, based on different development scenarios.

At key points in this process, the TPC held meetings with the public to solicit their input into the preparation of a preferred alternative concept plan. Upon completion of the data collection and analysis phase of the project, extensive public outreach village meetings were held to report the findings to the residents of the island.

Over 1,800 people attended these meetings and provided additional information, as well as their thoughts and concerns for the future of Guam. Following these village meetings, a series of alternative development concepts were prepared and, again, were presented to the public at the second set of village meetings for their consideration, input, and response. More than 800 residents attended these meetings and responded by selecting a preferred alternative, and it is from these meetings that the development of the Land Use Plan has evolved and is presented in this document.

Two groups, the Citizens Advisory Committee, CAC and the Technical Advisory Committee, TAC were formed and were active participants in the development of I Tano'-ta: The Land Use Plan for Guam and the Zoning Code. During the past two years, meetings with the Advisory groups were held enabling the TPC and their consultants to refine the concept plans with specific local knowledge of conditions and processes.

The CAC, comprised of citizens representing a broad range of community groups and private citizens provided diverse viewpoints to the planning process. The CAC formed an important link between the community, the Territorial Planning Council and the consultants. They were instrumental in generating awareness with the community, by offering public input and viewpoints to the Council. A list of the CAC group is found in Appendix A.

The Land Use Plan affects a whole range of governmental agencies and independent authorities. To insure that all who are involved in significant planning efforts and studies by these individual department and agencies of the Territory, the creation of an interagency/technical advisory committee was pertinent. The intent of TAC is to create a dialogue which will allow for the collectively pooling of knowledge of both public and private experts in order to produce a plan which is technically sound, balances diverse values and represents realistic costs and benefits. The TAC group was instrumental in identifying information, evaluating the accuracy of data, aided in establishing evaluation criteria and for a general review for scientific accuracy in various planning alternatives. A list of the TAC group is found in the Appendix A.

The third phase of the planning process resulted in the development of a Final Plan based on a third series of village meetings and extensive public comment on the Final Plan and the preparation of regulations necessary to implement the Plan. The new Zoning Code is the regulatory mechanism that will determine how development will occur within the Territory.

SUMMARY OF FINDINGS

The size of the Territory presents rigorous constraints on potential activities and limits options for development. In a small island environment such as that which exists in Guam, even isolated activities imply certain potential impacts. Resources are scarce and particularly fragile. Environmental, visual, social, and economic impacts can be felt immediately throughout the entire island.

THE PLANNING PROCES

WHAT DO WE HAVE?
(Data Collection / Analysis)

WHAT DO WE WANT?
(Plan Preparation)

HOW DO WE GET WHAT WE WANT?
(Implementation)

Collect Data on:

- Environmental Affairs
- Land Use
- Transportation
- Public Facilities
- Public Services
- Historic and Archaeological Sites
- Physical Considerations
- Major Land Holdings
- Historic Growth Patterns

Alternative Plan #1

Alternative Plan #2

Alternative Plan #3

FINAL PLAN

Capital Improvements Program

The Zoning Code

Rapid unplanned growth has led to a number of social, cultural, economic and environmental problems that have served as an impetus in the preparation of the Land Use Plan. These issues include infrastructure deficiencies, lack of affordable housing and environmental degradation.

INFRASTRUCTURE CONCERNS

Rapid increases in population and economic development and a decrease in federal subsidies for capital improvement projects has affected the efforts of the Government of Guam to provide a sufficient level of public services required in the Territory.

The Government is responsible for providing basic services in two key areas: adequate and safe treatment of wastewater and provision of a public potable water supply. At the present time, both of these public services are affected by population increases and new development. They are often unable to deliver sufficient quantity and adequate quality of service.

The greatest deficiencies occur primarily in the fastest growing areas where new development may quickly exceed the capacity of existing infrastructure, and in the slower growing outlying regions of the island where the priority for capital improvements often rank behind those of the more populous regions of the island.

In an effort to help correct this imbalance, Public Law 19-47 was recently passed. This law provides for funds to be generated through the assessment of development impact fees required of developers who seek to connect into the island's water or wastewater system for the first time. This would assist the taxpayers of Guam by releasing them from the burden of the cost of new customers' demand for expanded service.

If the Government of Guam considers economic development a primary objective, it must address the corresponding needs in its existing infrastructure. It must find ways to improve the water and wastewater systems to allow for expanded and diversified economic development and to upgrade the quality of life for its people.

Rapid development and population growth are creating an overloaded condition on the wastewater treatment system. The problems are in both the capacity and location of collection lines, as well as the capacity in the treatment plants. Inadequate infrastructure has placed several development projects on hold, and has also resulted in the discharge of untreated or poorly treated effluent into streams and coastal lagoons, which poses potentially serious health problems as well. This situation is exacerbated during periods of heavy rainfall when stormwater runoff flows into sanitary sewer lines and the capacity of the collection system is quickly overloaded.

The island's predominant source of potable water is groundwater. Guam, with its aquifers in the northern and central portions of the island, is blessed with a plentiful amount of fresh water. However, there are growing concerns that rapid growth is quickly depleting the supply of groundwater and that certain land uses are endangering the quality of the groundwater.

The public water system in the Territory is plagued with problems of unaccounted usage of this precious resource. The efficiency rate (i.e., the known number of gallons consumed relative to the known number of gallons produced) hovered between 50 and 60 percent during the 1980's. This is extremely low when compared to efficiency rates of 80 to 90 percent that are the norm in other more urban communities. The main reasons for this abnormally high loss are line leakages and unmetered connections into the water distribution system. The primary distribution lines were installed more than 45 years ago, and these pipe systems may conspicuously be leaking large volumes of water, especially in the southern portion of the island. PUAG is actively seeking to rectify both problems through a leak detection program.

Traffic circulation is a mounting problem in the Territory. Traffic congestion will continue especially during peak periods (i.e., 7-9 a.m. and 4-6 p.m.) and as more and more automobiles are brought to the island. In 1991, there were more than 100,000 registered vehicles in Guam. This amounts to approximately one vehicle for every 1.3 residents, one of the highest vehicle-to-population ratios in the world, given an island setting with limited land area. Traffic accident data from the Guam Police Department indicate that highway accidents doubled from a decade earlier (from 4,591 in 1980 to 9,181 in 1990), highway deaths increased by more than 50 percent over the same time period, and property damage almost doubled.

The mobility offered by automobiles has meant that the population may spread out further away from the traditional work places and shopping areas. Traffic flows have increased on the highways around the significant traffic generating land uses (i.e. hotels, shopping centers, offices, airport, etc.). Yet the spreading out of the population has made it difficult to achieve the critical density necessary for mass transit to significantly reduce the number of vehicles on the roadways.

The major residential, commercial, and industrial developments are located in the central and northern portions of the island along the highway. Due to traffic generated by that development, most of the very high traffic volumes occur in and around the Agana, Tamuning, and Barrigada areas. Traffic is slowed down further by the poor condition of many of the roads, inadequate pedestrian access across them, and their frequent flooding during the rainy season.

LACK OF AFFORDABLE HOUSING

The total supply of housing units generally kept pace with the growth in population from 1980 to 1990. Both indices increased by approximately 25 percent during the decade. However, this should not suggest a relatively open or "saturated" housing market. In fact, the housing tenure ratio in Guam is marked by a majority of renter-occupied dwelling units compared to owner-occupied units. This reflects a high degree of labor-related in-migration which, in turn, creates an immediate demand for more short-term (i.e., rental) accommodations and results in a longer-term "pent-up" demand for owner-occupied housing.

This type of housing tenure relationship is atypical of older, more stable communities, but is not uncommon in many small, high-growth, tourism-dependent communities with whom regional housing markets (which may act to absorb the "pent-up" demand) are not readily available. Even more obvious is the impact on housing values. As large scale tourism and commercial development bids up the price of the remaining land, housing values must follow suit. This, as anyone who has looked into housing costs in the Territory over the past 10 years can attest to, is the current situation in Guam.

Families, whose income levels do not rise as quickly as market-sensitive housing values, are unable to find reasonably-priced housing. Thus, a shortage of "affordable housing" occurs. Many residents must then find cheaper, more available rental housing or live with extended family members. The situation is further exacerbated by the fact that many of the rental units (mostly condominiums) are designed for longer-term tourist arrivals, and as such are not priced in a range affordable to many residents.

Growth in the value of residential construction (residential, apartments, and condominiums) has increased significantly during the 1980s. However, at the same time, the lack of affordable housing for many low and moderate income households has led to more direct intervention in the housing market by the Government of Guam to serve the housing needs of these households.

ENVIRONMENTAL DEGRADATION

Perhaps the most striking impact of growth and development in the Territory has been the environmental damage that has occurred to the land and marine ecosystems.

The quality of most coastal waters is still relatively excellent. Some areas, however, have received pollution impacts and include Tumon Bay, Tanguisson, Agana Bay, Apra Harbor, Agat Bay, Pago Bay and Cetti Bay. The quality of surrounding waters is affected mainly by sediment runoff, dredging and filling activities, and the discharge of thermal and sewage effluents. The degradation of water quality can have severe adverse impacts upon certain fragile near-shore ecosystems, including beaches, coral reefs, mangrove mudflats, and seagrass beds. These marine resources constitute significant foundations to not only the visual quality of life, but to the economic prosperity of the Territory as well.

Sediment Runoff - The problem of excessive sediment runoff is caused primarily by increased urbanization of previously undeveloped lands and fires in grassland on slopes. Construction activities disturb the soil by stripping vegetation and altering natural landforms. Alterations to the existing land cover, such as the construction of housing and paving, increased runoff and the flow of sediments, thereby contributing to turbidity in coastal waters. The effects of sediment runoff are particularly acute and noticeable in the bays and harbors adjacent to developed watersheds immediately following a heavy rainfall. Large plumes of silt extend from the mouths of natural drainage ways into the adjacent waters. The sedimentation effects are harmful to the marine environment, aesthetically objectionable, and increase the necessity for maintenance dredging.

Attempts to manage stormwater are relatively new. Stormwater management regulations in the continental United States have only been created in any meaningful way in the past ten years. However, most researchers agree that stormwater runoff is responsible for the following problems:

- Stormwater flushes nutrients and carries disease organisms into coastal waters at a rate comparable to effluent discharges from wastewater treatment facilities; and
- Stormwater deposits 80 to 95 percent of the heavy metals that reach the coastal waters. Lead, zinc, copper cadmium, and chromium, along with oils and greases, are flushed from highways and parking areas into the coastal waters. Heavy metals are toxic to plankton, fish, and other aquatic organisms, reducing their ability to reproduce.

Dredging and Filling Activities - Dredging of sand and other materials to create landfill, swimming areas, marina sites, improve navigation, and provide enhanced beachfronts has occurred in near-shore areas and altered these ecosystems, especially in Tumon Bay, Agana and Piti.

Near-shore dredging activities increase turbidity that disrupt natural marine ecological systems and create potential beach erosion problems. The alteration and destruction of wetlands and ponds affect fish and wildlife productivity and add to the drainage and flushing of storm and flood waters on adjacent beaches. Both sediment runoff and dredge and fill activities have resulted in increased water turbidity. Heavy sedimentation has damaged both reef and fish-life, and is also unappealing for swimming and snorkeling. Turbid or cloudy waters limit the light needed by corals and for food production by marine plants. These latter conditions, if allowed to continue, will ultimately have a detrimental effect on the tourism industry in the Territory.

-
- **Discharge of Sewage Effluents** - The discharge of raw or partially treated sewage and toxic substances from overloaded sewage treatment plants and inadequate septic tanks contributes significantly to the deterioration of water quality. In a few instances, liquid waste is disposed of in pristine waters or in waters with the least capacity to tolerate further stresses. Even minimal degradation of water quality can have severe adverse impacts upon certain fragile near-shore ecosystems.
 - **Loss of Natural Areas** - Unfortunately, areas that are frequently attractive for the location of economic activities are ecologically fragile and extremely vulnerable to development of any kind. The loss of natural areas is frequently the result of fast paced growth. Ecologically valuable limestone forests have been destroyed and mangroves and beaches have been filled or dredged to accommodate development. In other instances, the functioning of these vital areas has been impaired by encroaching development. These losses are irrevocable and have contributed to declining marine productivity, as well as other coastal resource related problems.
 - **Visual Conflict** - One of the most important resources of Guam is its high degree of visual quality. The island is beautiful, and its beauty satisfies residents and tourists alike. A problem which arises from the competition for shoreline space is conflict resulting from haphazard development. Piecemeal destruction of coastal resources, and the type of construction and location of facilities along the shoreline is a major aesthetic concern. Frequently, adjacent uses conflict drastically in character, as well as the quality of design, construction and maintenance between buildings. No single incongruity is so serious but cumulatively, even small projects deface the landscape.

LAND USE PLAN PROCESS

INTRODUCTION

The land available for future development in the Territory encompasses a finite amount of area. If growth were to continue in the Territory for the next 25 years in the same manner that it has for the past quarter century, a considerable amount of land would be consumed and the various infrastructural deficiencies that currently exist would be even greater. Additionally, stronger pressures would be brought to bear on environmentally sensitive lands and precious natural resources. Therefore, a balanced approach must be employed to establish guidelines for directing growth into those areas best suited for development.

The Land Use Plan process seeks to identify the major issues affecting the quality of life for Guam's residents and visitors alike. I Tano'-ta attempts to ensure that future growth takes place in a manner which reflects the need for expansion in all social and economic sectors, and, at the same time, recognizes the need for establishing guidelines for growth in areas where unplanned development would have a significant negative effect on the well-being of the people of Guam. I Tano'-ta itself is primarily concerned with the arrangement and type of land uses, their impact on the environment, and relation to community development.

Four fundamental themes have provided the framework for the development of I Tano'-ta: The Land Use Plan for Guam:

1. Directing growth and economic development activities into areas where public services, such as potable water, sanitary sewer, mass transit, and community resources, including schools and recreational areas, are adequately provided. This reduces social and personal costs by reducing energy consumption and requiring less of an expenditure of government funds to extend public services.
2. Protecting environmentally-sensitive lands. These are lands and waters that have overriding ecological, hydrological, topographical, aesthetic, or cultural importance and which cannot be developed without either seriously impairing their function or causing an irreplaceable loss of resources.
3. Allocating land use commensurate with the Territory's goal of economic diversification and expansion. This theme is more fully explored in the Overall Economic Development Program (OEDP), prepared by the Guam Economic Development Authority. The OEDP

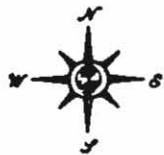
serves to target specific services and industries appropriate to the Guam economy, while encouraging the preservation of the Territory's more traditional industries, including agriculture and fisheries.

4. Promoting the creation of more affordable housing by encouraging the development of mixed use activities and higher density residential development opportunities. On a small island, a strong tourism market and rising land values, housing values often increase at a rate which may ultimately exceed the affordability of local residents. Lacking incentives to participate in the locally-oriented housing market, housing developers are usually slow to respond to these needs without some form of government incentives or requirements.

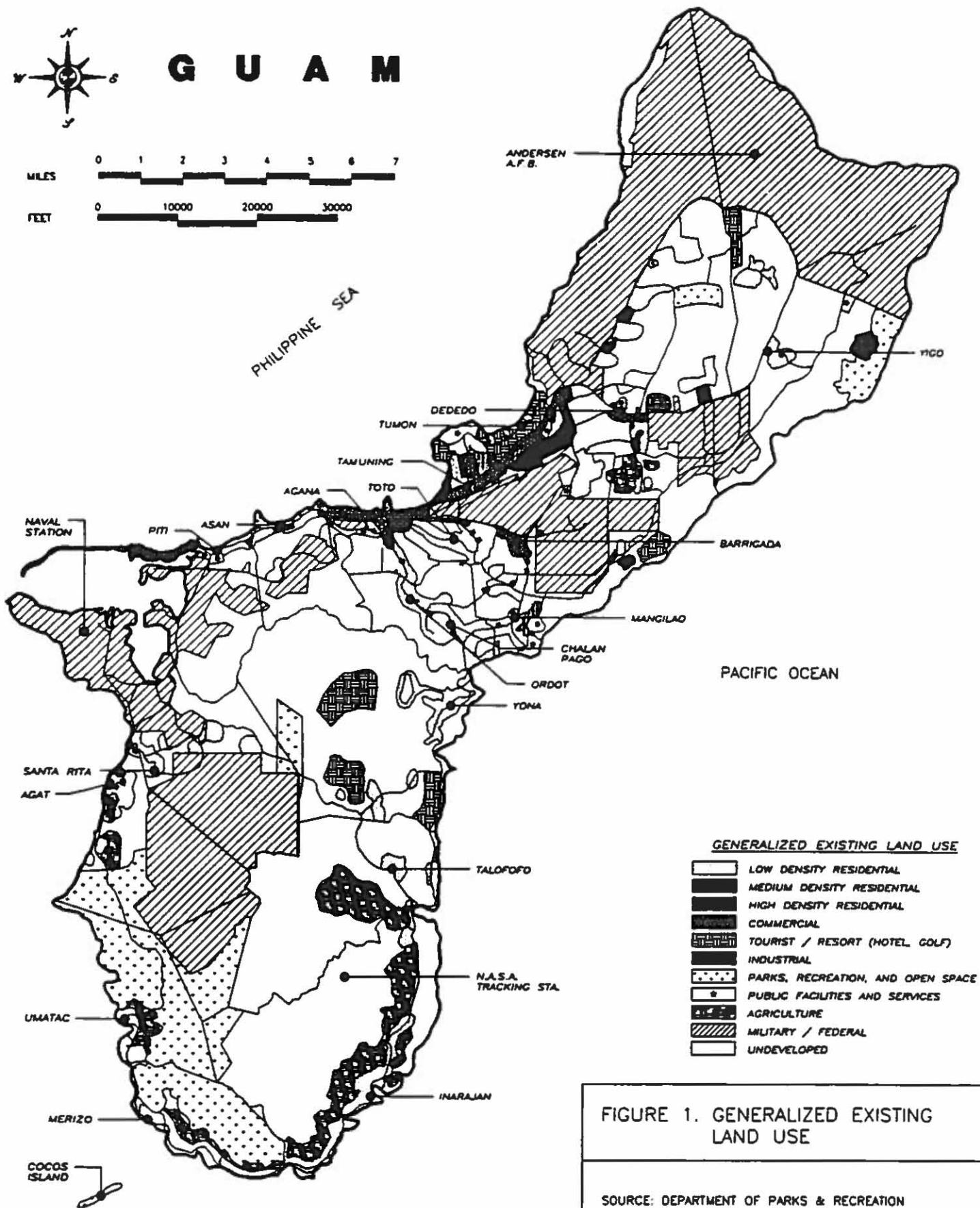
EXISTING LAND USE CONDITIONS

From 1988 through 1992, Guam has experienced an unprecedented economic and population boom. Over the last thirty years, from 1960 and 1990, the resident population has doubled from 67,000 to over 133,000. The island has grown with continued immigration from Asia, recent immigration from Micronesia, along with approximately 20,000 U.S. military personnel and their dependents. At the same time, Japanese tourists drawn by the warm tropical waters and new resort developments have visited the island in increasing numbers. Demand for workers in the construction and service industries has quickly outpaced the local labor supply and many off-island workers have come to Guam creating even more demand for housing and commercial support services. The rapid build-up has increasingly burdened the Territory's infrastructure systems, including roads, potable water, and sanitary sewer. As the pace of development activity has increased, it has begun to spread out away from the more developed urban areas into rural areas.

Guam consists of approximately 212 square miles, most of which still remains undeveloped. The majority of the island's residents live in the northern portion of the island, in the villages of Tamuning, Dededo, and Yigo an area of the largest, most recent residential growth. About 30 percent of Guam's residents live in the central portion of the island, in and around Agana Heights, Sinajana, Barrigada, Mangilao, and Chalan-Pago. The smallest area of population is in the southern sector of Guam, where due to rough terrain, the villages remain small and relatively undeveloped. The southern villages retain a slower-paced, traditional island lifestyle and architecture, while the central and northern portions are developing a more westernized, urban flavor. Existing land use patterns on the island are shown in **FIGURE 1.**



G U A M



GENERALIZED EXISTING LAND USE

- LOW DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- COMMERCIAL
- TOURIST / RESORT (HOTEL GOLF)
- INDUSTRIAL
- PARKS, RECREATION, AND OPEN SPACE
- PUBLIC FACILITIES AND SERVICES
- AGRICULTURE
- MILITARY / FEDERAL
- UNDEVELOPED

FIGURE 1. GENERALIZED EXISTING LAND USE

SOURCE: DEPARTMENT OF PARKS & RECREATION
W.B. FLORES & ASSOCIATES

Most of the tourist-oriented development is located in the center of the island, concentrated in Tamuning and along Tumon and Agana Bays. In 1992, there were more than 5,000 hotel rooms on-island, most of them in this area. An additional 10,000 rooms have received Government approval, many of which are already under construction. In addition, almost 10,000 condominium units have been approved and another 2,000 units are pending government action. Many of these developments are proposed to be built in the rural areas of the island, outside of the existing tourist/resort development sectors.

The major military installations are located in the northern and central areas, including Andersen Air Force Base in the north and Naval Air Station in Agana, the Naval Station facility in the Apra Harbor area and Naval Magazine in Santa Rita, where the Fena Reservoir is located.

Land Ownership

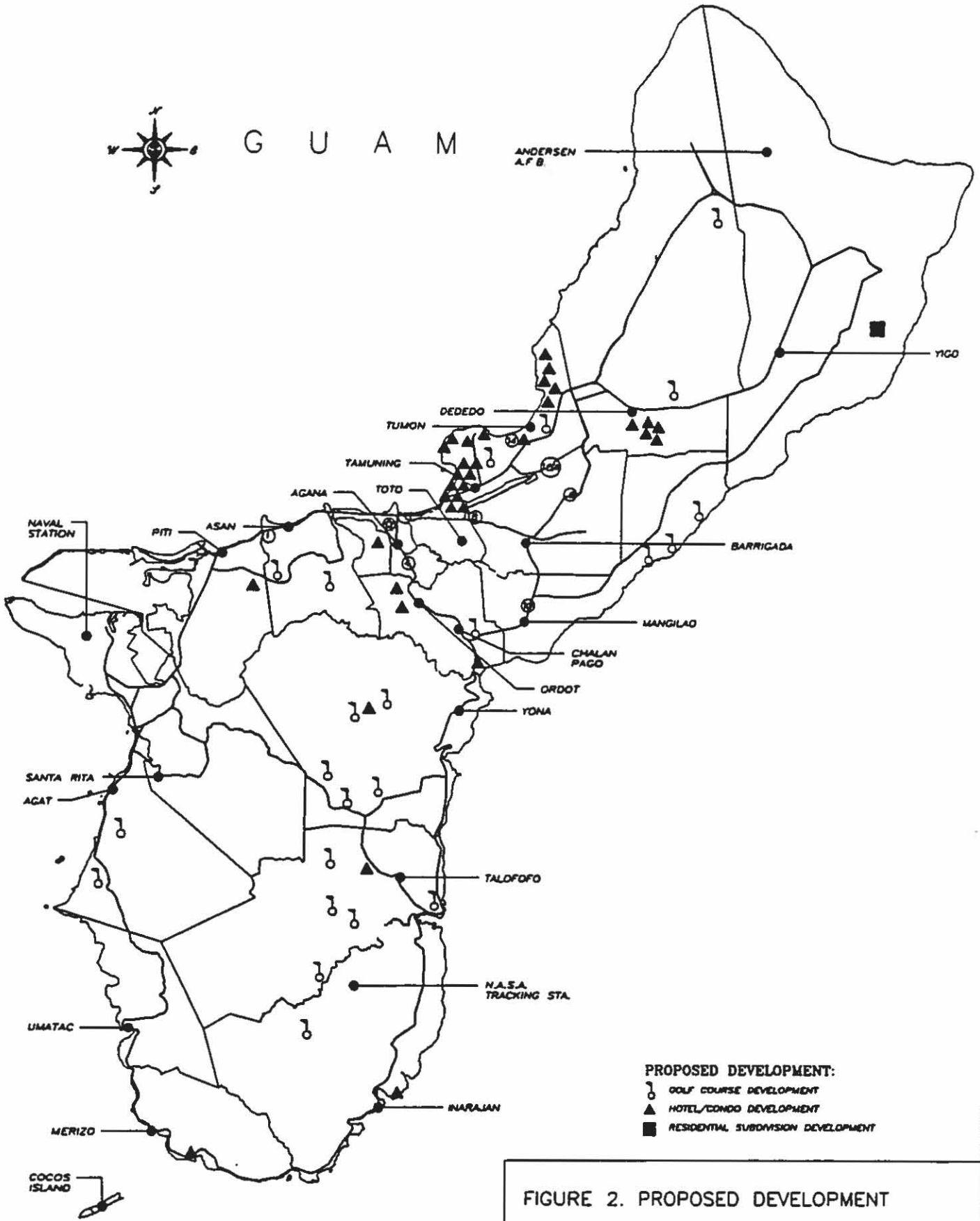
Land ownership on Guam is divided into three major categories: Federal Government, Government of Guam, and private individuals and corporations. According to the Bureau of Planning, the Federal Government controls 32 percent of the island's total land area as military reservations. The Government of Guam owns approximately 20 percent, and the remainder, about 48 percent, is under private ownership.

Major Proposed Developments

As the tourist industry continues to grow on Guam, the demand for new development, particularly tourist/resort uses, including condominiums, hotels, retail, and golf courses, has increased. In Fiscal Year 1990, 2,164 construction permits were issued at a value of \$486,082,000; an increase from 2,043 permits with a valuation of \$362,987,000 in Fiscal Year 1989. Figure 2 shows the location of the major developments that are proposed or are currently under construction. These developments include:

- 64 hotel projects (some are additions to existing hotels);
- 66 condominium projects;
- 22 golf courses (some are expansions of existing courses); and
- 1-132-unit executive home subdivision.

As the map indicates, many of these developments are proposed for rural areas of the island outside of the existing tourist/resort development areas. A complete listing of proposed hotel and condominium development projects is shown in TABLE 1.



PROPOSED DEVELOPMENT:
 ○ GOLF COURSE DEVELOPMENT
 ▲ HOTEL/CONDO DEVELOPMENT
 ■ RESIDENTIAL SUBDIVISION DEVELOPMENT

FIGURE 2. PROPOSED DEVELOPMENT

SOURCE: LAND MANAGEMENT/W.B. FLORES

**TABLE I
GUAM HOTEL AND CONDOMINIUM UNITS INVENTORY**

VILLAGE/PROJECT (UNITS)	TYPE (UNITS)	EXISTING (UNITS)	APPROVED (UNITS)	PENDING	POTENTIAL
<u>AGANA</u>					
Agana Marina Complex	H	0	440	0	0
International Marina (Downtown)	H	48	0	0	0
International Marina Hotel	H	45	0	0	0
<i>Subtotal:</i>		93	440	0	
<u>AGANA HEIGHTS</u>					
Cliff Hotel	H	34	0	0	0
Jones & Guerrero Co., Inc.	C	0	130	0	0
<i>Subtotal:</i>		34	130	0	
<u>AGAT</u>					
Agat Hilltop Garden Hotels	H	0	196	0	0
Fujimoto International, Inc.	H	0	224	0	0
Inn on the Bay	H	70	0	0	1,600
Jo-In International	H	0	0	0	0
Nomura Agat Resort Hotel	H	0	380	0	0
Nomura Agat Resort Condo	C	0	0	314	0
Sea View Terrace	C	0	0	264	0
<i>Subtotal:</i>		70	800	578	1,600
<u>ASAN</u>					
Lonfit New Town Hotel	H	0	0	200	
Fonte Villa Palm Condo	C	0	48	0	0
Lonfit New Town Condos	C	0	0	240	0
Okso' Taguak	C	0	0	240	0
<i>Subtotal:</i>		0	48	680	0
<u>BARRIGADA</u>					
Cas International Dev.	H	0	78	0	
Guam International Hotel	H	0	64	0	0
Ok Soon Lee	H	0	0	33	0
Coral Sea Realty	C	0	98	0	0
Pacific Economic Dev.	C	0	518	0	0
<i>Subtotal:</i>		0	758	33	0
<u>CHALAN PAGO/ORDOT</u>					
Apusento Gardens	H	120	0	0	
United Pac. Inv. & Dev., Inc.	H	0	100	0	0
Choken Corp. Guam	C	0	92	0	0
Golden Palm Condos	C	0	30	0	0
United Pac. Inv. & Dev. Co.	C	0	0	692	0
Villa Toloha	C	0	24	0	0
<i>Subtotal:</i>		120	246	692	0

TABLE I (continued...)
GUAM HOTEL AND CONDOMINIUM UNITS INVENTORY

VILLAGE/PROJECT (UNITS)	TYPE (UNITS)	EXISTING (UNITS)	APPROVED (UNITS)	PENDING	POTENTIAL
<u>DEDEDO</u>					
Dededo Business Hotel	H	0	0	182	0
Grandview Hotel	H	0	450	0	0
Hatsuho International Inc.	H	0	15	0	0
Gordon Chu	C	0	0	30	0
Josephine McKeever	C	0	0	88	0
Pacific Group Dev., Inc.	C	0	48	0	0
Platinum Land Corp.	C	0	46	0	0
Villa Gloria condos/Apts.	C	0	0	42	0
Villa Rosario	C	0	141	0	0
<i>Subtotal:</i>		<i>0</i>	<i>700</i>	<i>342</i>	<i>0</i>
<u>GUN BEACH</u>					
Hasegawa-Koauten	H	0	0	0	500
<i>Subtotal:</i>		<i>0</i>	<i>0</i>	<i>0</i>	<i>500</i>
<u>INARAJAN</u>					
Dandan Estates & CC Hotel	H	0	200	0	0
Inarajan Bay Hotel	H	0	0	0	100
Inarajan Garden House	H	26	0	0	0
Taotao Resorts	H	0	0	0	2,800
Dandan Estate & CC Condo	C	0	720	0	0
<i>Subtotal:</i>		<i>26</i>	<i>920</i>	<i>0</i>	<i>2,900</i>
<u>MANGILAO</u>					
Hanil Resorts	H	0	0	0	590
Tech Chan (Oriental Kitchen)	H	0	0	26	0
Fadian Development, Inc.	C	0	1,436	0	0
Marbo Cave Resort	H	0	1,200	0	0
Marbo Cave Resort Condos	C	0	600	0	0
T & K Development Corp.	C	0	218	0	0
<i>Subtotal:</i>		<i>0</i>	<i>3,454</i>	<i>26</i>	<i>590</i>
<u>MERIZO</u>					
Cocos Island Resort	H	118	0	0	0
<i>Subtotal:</i>		<i>118</i>	<i>0</i>	<i>0</i>	<i>0</i>
<u>PAGO BAY</u>					
Guam Aida Inc.	C	0	0	60	0
Pago Bay Gardens Condo	C	0	0	198	0
<i>Subtotal:</i>		<i>0</i>	<i>0</i>	<i>258</i>	<i>0</i>
<u>PITI</u>					
Montyear Yuren/Em Chen	C	0	48	0	0
<i>Subtotal:</i>		<i>0</i>	<i>48</i>	<i>0</i>	<i>0</i>
<u>TALOFOFO</u>					
Kurason Guahan Hotel	H	0	0	150	0
Pricia Inc. Hotel	C	0	40	0	0
<i>Subtotal:</i>		<i>0</i>	<i>40</i>	<i>150</i>	<i>0</i>

TABLE 1 (continued...)
GUAM HOTEL AND CONDOMINIUM UNITS INVENTORY

VILLAGE/PROJECT (UNITS)	TYPE (UNITS)	EXISTING (UNITS)	APPROVED (UNITS)	PENDING	POTENTIAL
TAMUNING					
A & R Limited	H	0	0	0	451
AB Hotel (Seahorse) Asahi	H	0	0	0	0
AIWA Inc.	C	0	0	0	0
Big Point	H	0	0	0	16
Capital Hotel	H	32	0	0	0
Chiyoda Guam Corp.	H	0	0	0	0
City Hill Co.	C	0	67	67	0
Dai-Ichi Hotel	H	338	0	0	0
EIE Guam Corp.	H	0	0	0	448
Faifai Beach Resort Hotel	H	0	0	0	0
Frank Ko	H	0	0	0	400
Fujita Hotel	H	283	0	0	0
General Enterprises	H	0	0	0	0
Grand Hotel	H	99	0	0	0
Guam American Hotel	H	50	0	0	0
Guam AB Hotel	H	0	446	0	0
Guam Beach Hotel	H	26	0	400	0
Guam Hardwood Hotel	H	0	0	0	120
Guam International Trade Ctr.	H	33	0	0	0
Guam Plaza Hotel	H	518	0	0	0
Hakubotan Inc.	H	0	0	0	581
Hilton International	H	486	247	0	0
Horizon Hotel	H	104	0	0	0
Hotel Mai'Ana	H	77	0	0	0
Hyatt Regency	H	0	448	0	0
Hyoon Joon Const.	H	0	104	0	0
Imperial Hotel (Hale Kai)	H	0	0	244	0
Joinus Hotel/Tumon Sands	H	36	0	0	0
Leo Palace Hotel	H	0	382	0	0
Loh Chiao	H	0	85	0	0
Macau-Hong Kong Dev., Inc.	H	0	0	0	400
Marriott Hotel	H	0	0	0	500
Matsuzato Guam Resort	H	0	157	0	0
Milo Corporation	H	0	32	0	0
Nikko Hotel	H	0	500	0	0
Ocean Plaza	H	0	16	0	0
Oka Towers	H	24	0	0	0
Okura Hotel	H	224	163	0	0
Onward Agana Beach Hotel	H	0	300	0	0
Pacific Islands Club Res.	H	491	854	0	0
Pacific Star Hotel	H	436	0	0	0
Palace Hotel	H	405	0	0	0
Peter Chang	H	0	0	0	19
Pia Resort Hotel	H	55	0	0	0
Polynesian Hotel	H	35	0	0	0
Reef Hotel	H	167	0	0	0
Regency II	H	63	0	0	0
Regency III	H	60	0	0	0

**TABLE 1 (continued...)
GUAM HOTEL AND CONDOMINIUM UNITS INVENTORY**

VILLAGE/PROJECT (UNITS)	TYPE (UNITS)	EXISTING (UNITS)	APPROVED (UNITS)	PENDING	POTENTIAL
Regency IV	H	0	0	156	0
Royal Hotel (Bhnd. ITC)	H	0	0	90	0
Royal Hotel (near Tahiti)	H	0	0	0	600
Sachdev P & A	H	0	113	0	0
Saint Villa Resorts	H	0	0	0	96
Suehiro/Tumon Plaza Hotel	H	38	250	0	0
Sun Route Hotel/Regency I	H	66	0	0	0
Tamuning Plaza (Union)	H	40	0	0	0
Tamuning TLA Hotel	H	0	0	0	113
Terraza Hotel	H	22	10	0	0
Tropicana Hotel	H	192	0	0	0
Tumon Fountain Plaza	H	0	290	0	0
Tumon Holiday Plaza	H	130	0	0	0
Tumon Plaza Hotel	H	0	252	0	0
Tumon Royal Hotel	H	0	0	0	300
Tumon Villa Hotel	H	18	0	0	0
Unite Overseas Investment	H	0	85	0	0
Yamanoi Guam Hotel	H	0	61	0	0
Hyun Joon Construction	H	0	0	140	0
Akimoto Condo	C	0	0	20	0
Alupang Beach Tower	C	0	0	138	0
Baba Corporation	C	0	56	0	0
Chateau Michelle/G. Lee	C	0	0	25	0
City Hill Co. Guam Ltd.	C	0	0	67	0
Continental Dev. Corp.	C	0	19	0	0
Faifai Beach Resort Condo	C	0	400	0	0
George Lee	C	0	72	0	0
Guam Five Star Corp.	C	0	31	0	0
Guam Greyhound Inc.	C	0	66	0	0
Hyun Joon Corporation	C	0	15	0	0
Itoman Real Estate Sales	C	0	209	0	0
James JI Enterprises	C	0	44	0	0
Jonestown Condo & Villa	C	0	322	0	0
Kawasho International GU	C	0	220	0	0
Keijo Shoji Construction	C	0	21	0	0
Kim Yen Corp.	C	0	32	0	0
King's Garden	C	0	24	0	0
Kojimaya Dev. Guam	C	0	0	54	0
Loh Chiao Condos	C	0	15	0	0
Matsuzato Guam Resort Con.	C	0	719	0	0
Mutsumi Iwayama	C	0	16	0	0
Palm Seas Condo	C	0	0	9	0
Pia Resort Condominiums	C	54	0	0	0
Raymond Fleming	C	0	11	0	0
Regency Tower	C	0	0	14	0
Ryoko Guam Dev. Corp.	C	0	130	0	0
San He Villa	C	0	0	11	0
Segu International Inc.	C	0	40	0	0
Su Eur Huang	C	0	21	0	0
Sung Hee Dev. Inc.	C	0	0	102	0
Tumon Loop Condos	C	0	0	0	130

TABLE 1 (continued...)
GUAM HOTEL AND CONDOMINIUM UNITS INVENTORY

VILLAGE/PROJECT (UNITS)	TYPE (UNITS)	EXISTING (UNITS)	APPROVED (UNITS)	PENDING	POTENTIAL
Yamacho Guam, Inc.	C	0	0	32	0
Yamanoi Guam Condos	C	0	0	54	0
Young Lee	C	0	0	0	0
<i>Subtotal:</i>		<i>4,902</i>	<i>9,886</i>	<i>1,650</i>	<i>4,174</i>
<u>TOTO/MAITE</u>					
Kina Court	H	31	0	0	0
Maite Garden Hotel	H	48	0	0	0
Plumeria Garden Hotel	H	78	0	0	0
Chiang's Corporation	C	0	28	28	0
<i>Subtotal:</i>		<i>157</i>	<i>28</i>	<i>28</i>	<i>0</i>
<u>URUNAO</u>					
Urunao Resort Corp.	H	0	0	0	1,000
<i>Subtotal:</i>		<i>0</i>	<i>0</i>	<i>0</i>	<i>1,000</i>
<u>YONA</u>					
Manengon Hills Hotel	H	0	200	0	0
YLIIG Shores, Inc.	H	0	0	0	891
Manengon Hills Condo	C	0	2,150	0	0
<i>Subtotal:</i>		<i>0</i>	<i>2,350</i>	<i>0</i>	<i>890</i>
TOTAL		5,520	19,828	4,409	11,654

Note: Project Type: H=Hotel; C=Condominium

Source: Guam Bureau of Planning, 1992
W.B. Flores/SPG

At the present time there are more than 5,500 existing hotel and condominium units on Guam. According to the Bureau of Planning, there are approximately 19,000 hotel and condominium units approved for development; over 4,000 units currently going through the permitting process; and another 11,654 units listed as potential development (i.e., no formal applications for development have yet been initiated).

The distribution of proposed development by village is outlined in Table 2 with the largest proportion of tourism-related development slated for Tumon/Tamuning, Barrigada, Yona, Mangilao, and Agat respectively. Significant increases in tourism-related development has also been proposed for many other villages which, to date, have not experienced significant hotel or condominium development. These include Dededo, Inarajan, Chalan Pago-Ordot, Asan, and Talofof. Despite the tremendous amount of redevelopment and permitting activity, the recent economic recession in Japan and the U.S. has forced the slowdown or delay in many proposed projects. For this reason, the actual absorption rate of hotel and condominium development is expected to slow over the planning horizon.

APPROVED/VILLAGE	EXISTING	PERCENT	APPROVED PENDING	PERCENT
Agana	93	1.7	440	1.8
Agana Heights	34	0.6	130	0.5
Agat	70	1.3	1,378	5.7
Asan	0	0.0	708	2.9
Barrigada	0	0.0	791	3.3
Chalan Pago/Ordot	120	2.2	938	3.9
Dededo	0	0.0	1,042	4.3
Inarajan	26	0.5	920	3.8
Mangilao/Pago Bay	0	0.0	3,738	15.4
Merizo	118	2.2	0	0.0
Piti	0	0.0	48	0.2
Talofofo	0	0.0	190	0.8
Tamuning/Tumon	4,902	88.6	11,525	47.6
Toto/Maite	157	2.9	28	0.1
Yona	0	0.0	2,350	9.7
TOTAL	5,520	100	24,226	100

Source: Guam Bureau of Planning, 1992

The proposed development picture at the present time suggests a significant spatial shift in the distribution of new tourism-related projects on Guam. This pattern is indicative of a "spreading out" of the tourism development away from its traditional core area in Tumon and Tamuning. Of particular importance to this pattern is the growing number of golf course-related resorts which require more extensive land areas that are not necessarily available in the Tumon Bay area. Incumbent upon this type of development, as well, is the need for additional water supplies to provide irrigation for these golf courses in addition to the everyday needs for the tourist population. TABLE 3 presents the location and the number of holes for the existing and proposed golf courses on Guam.

POPULATION GROWTH

To develop a Land Use Plan, the future population level to be accommodated must be determined and the limitations to future development identified.

"How many residents and tourists must we plan our facilities to accommodate?" This question is of critical importance to the Territorial Planning Council (TPC) officials whose current policies and programs will shape the future of Guam. The population estimates and projections for the island are among the most important technical variables used in any planning and development process. The rate of population growth will provide important information to help identify capital requirements for housing, transportation, recreation, schools, public health and safety, and other public and private facilities and services related to a modern, developed environment in Guam.

TABLE 3
GUAM GOLF COURSE DEVELOPMENT PROJECTS
(number of holes)

LOCATION	PROJECT	EXISTING	APPROVED	PENDING	POTENTIAL	TOTAL
Agat	Guam Country Club	0	18	0	0	18
Asan	Lonfit New Town Golf	0	0	18	0	18
Barrigada	Marbo Cave Resort Golf	0	18	0	0	18
Dededo	Hatsuho International	18	0	0	0	18
Dededo	Hatsuho International CC	0	9	0	0	9
Harmon	PD Hemlani Driving Range	0	0	0	0	0
Inarajan	Dandan Estate & CC Golf	0	54	0	0	54
Mangilao	Mangilao Golf Course	0	18	0	0	18
Talofoto	Country club of the Pacific	18	0	0	0	18
Talofoto	Guam Talofoto Country Club	0	0	18	0	18
Talofoto	Kurason Guahan Inc.	0	0	18	0	18
Talofoto	Takayama Golf Course	18	0	0	0	18
Talofoto	Talofoto Garden Golf Course	0	0	18	0	18
Talofoto	Talofoto Golf Course	0	18	0	0	18
Tumon	Guam Plaza Driving Range	0	0	0	0	0
Upper Tumon	Matsuzato Guam Golf	0	9	0	18	27
Yigo	Guam Municipal Golf	0	18	0	0	18
Yigo	Pagat Pt. Memorial Golf	0	0	0	18	18
Yona	Coco Palms Golf Course	0	0	18	0	18
Yona	Guam First Green Golf Club	0	18	0	0	18
Yona	Manengon Hills Golf	0	45	0	0	45
Yona	YY Golf & Country Club	0	18	0	0	18
TOTAL		54	243	90	36	423

Source: Guam Bureau of Planning, 1992.

Absent a plan delineating a direction for economic growth on the island, it was necessary to produce a population model for the Land Use Plan that was based on a series of economic assumptions. These assumptions are:

- a. That the current focus on tourism as a major economic player on the island will continue for a number of years.
- b. That as a result of this focus, the projected population growth on Guam will be significantly impacted by the number of new hotel rooms to be built on the island.
- c. That the impetus for economic diversity from local leaders will directly impact future population modeling that will necessitate an update of this population projection.
- d. That the current model must correspond to population models currently being developed for other planning documents such as the Water Facilities Plan for Guam, the Highway Transportation Plan, Wastewater Treatment Plan and etc.

Population and hotel room projections into the 21st century have been developed for the Department of Public Works as part of the Guam 2010 Highway Master Plan. Extrapolation of the 2010 Highway Plan projections to the Land Use Plan horizon year, 2015, indicates that the resident population of Guam in 2015 is expected to be approximately 263,000 permanent residents. This would indicate an increase of more than 130,000 persons over the next 25 years, or about a doubling of the current population. At the same time, the increasing number of hotel and condominium projects on the island illustrates the economy's growing reliance on tourism.

Utilizing similar extrapolation techniques based on the 2010 Highway Master Plan projections, Guam is likely to have approximately 19,000 hotel (tourist) units by 2015. This translates to a potential daily peak visitor population of approximately 32,500 tourists on the island, assuming a peak 95 percent occupancy rate and an average of 1.8 persons per room.

Determining where these new residents and tourists will live, shop, and work is the role of I Tano'-ta: The Land Use Plan for Guam.

AVAILABILITY OF PUBLIC FACILITIES AND SERVICES

One of the principal functions of government is to provide public services in the quantity and quality desired by the population being served. The Government of Guam has not always been able to accurately assess the levels of service it provides. This is due partly to the fact that the development of infrastructure has not always been tied to a projected level of growth and related standard(s).

For the Territorial Government to begin providing public services and facilities concurrent with the demand for these "public goods," the Land Use Plan proposes a systematic program to link and require future population growth (i.e., demand) with the adequate delivery of public services. The system, which is proposed to be incorporated into an overall Capital Improvements Program, is based on establishing, implementing, and monitoring appropriate levels of service for public facilities and services essential to improving the quality of life for the residents of Guam.

The purpose of incorporating public service coordination and standards into the Land Use Plan is three-fold: first, to insure that the provision of public services occurs at the proper level and at the proper time during the course of growth and development; second, to further the use of the delivery of public services as a positive planning tool; and third, to ensure that a tangible standard is set to measure the quality of life of the residents of the Territory. Through the use of these guidelines, the future growth (land use decisions) of the island can be guided through the provision of public facilities.

Public services and their facilities that have a direct effect on land use and are publicly managed are considered in the development of levels of services. These include park and recreation areas, public schools, police protection, fire/rescue services, transportation, wastewater treatment, potable water, solid waste, electrical power and health facilities.

The allocation of land uses in the Plan is based, to a large extent, on existing infrastructural conditions and planned remedial actions by the Public Utility Agency of Guam (PUAG) for the island's potable water and wastewater treatment systems, the Guam Power Authority (GPA) for the island's power generation system, and by the Department of Public Works (DPW) for the island's highway network. However, these have been utilized only to the extent that GovGuam agency proposed actions (plans) conform to the *overall* development criteria of the Land Use Plan.

The expansion of potable water and wastewater treatment systems and the improving and widening of roadways must be determined within the context of a rational land development policy. It makes little sense to propose an extension of sewer lines into an area where there is limited growth potential or serious environmental constraints. The Land Use Plan will provide the framework for guiding policy that will allow for the island to sustain additional growth.

Potable Water

Drinking water is obtained primarily from the northern water lens and from surface water sources in the south. The northern lens is the primary source of drinking water on Guam. The Northern Guam Lens Study, performed by the Guam Environmental Protection Agency in 1982, determined that an average of 112 million gallons of rainwater recharges the lens each day. This source could provide a sustained yield of approximately 60 million gallons of water per day (mgd). In 1991, groundwater supplied approximately 30 million gallons of water per day (including military consumption), or about 80 percent of the drinking water needs of the Guam population.

Preliminary studies have shown that significant sources of water are available in the northern portion of the island at Anderson Air Force Base. Currently, this property is not accessible to PUAG. These reserves may be separate from the rest of the aquifer in the northern lens. They are estimated to be able to supply sustainable yields of 18 mgd and are included in the 60 mgd estimate for the northern lens.

An additional concern of the northern lens is the concept of salt water intrusion. This concept describes the contamination of the northern lens by saltwater drawn into the aquifer by excessive water production at well sites. Current studies describe the aquifer as a connection of water troughs. The largest of these is referred to as the Yigo trough. Conventional theory assumed the northern lens was ubiquitous and that water was readily available from almost any location.

Existing Facilities

Potable water is provided to the island by the Public Utility Agency of Guam (PUAG). The agency meets Guam's water requirements in three major ways. These are through:

- (1) Well production, primarily using the northern aquifer;
- (2) Surface and spring supplies; and
- (3) Water purchased from Navy and Air Force reservoirs.

There are currently 92 PUAG wells in operation, predominantly over the northern aquifer, which provides approximately 81 percent of the island's water supply. Surface supplies and springs, including Asan Springs, Santa Rita Springs, Geus River Dam, Siligin Spring, and Laelae (Piga) Spring, provide an estimated three percent of the overall water supply. The military supplies approximately 16 percent (four mgd) of the total daily island water needs. The Navy receives the majority of its water supply from the Fena Lake Reservoir system and the Air Force gets its water from the Tumon-Maui well and several other wells in the Marbo and Upper Marine Drive area. Presently, the U.S. Air Force, U.S. Navy, and private water systems withdraw over 16 million gallons per day from the northern aquifer.

Regional Water Service Areas

Public water service areas are delineated on FIGURE 3, and listed with their existing capacities in TABLE 4.

SERVICE AREA	WATER CAPACITY IN MILLION GALLONS
Regional Water Service Area "A":	5,500
Regional Water Service Area "B":	6,500
Regional Water Service Area "C":	1,000
Regional Water Service Area "D":	5,800
TOTAL CAPACITY:	18,800

Source: Barrett Consulting Group

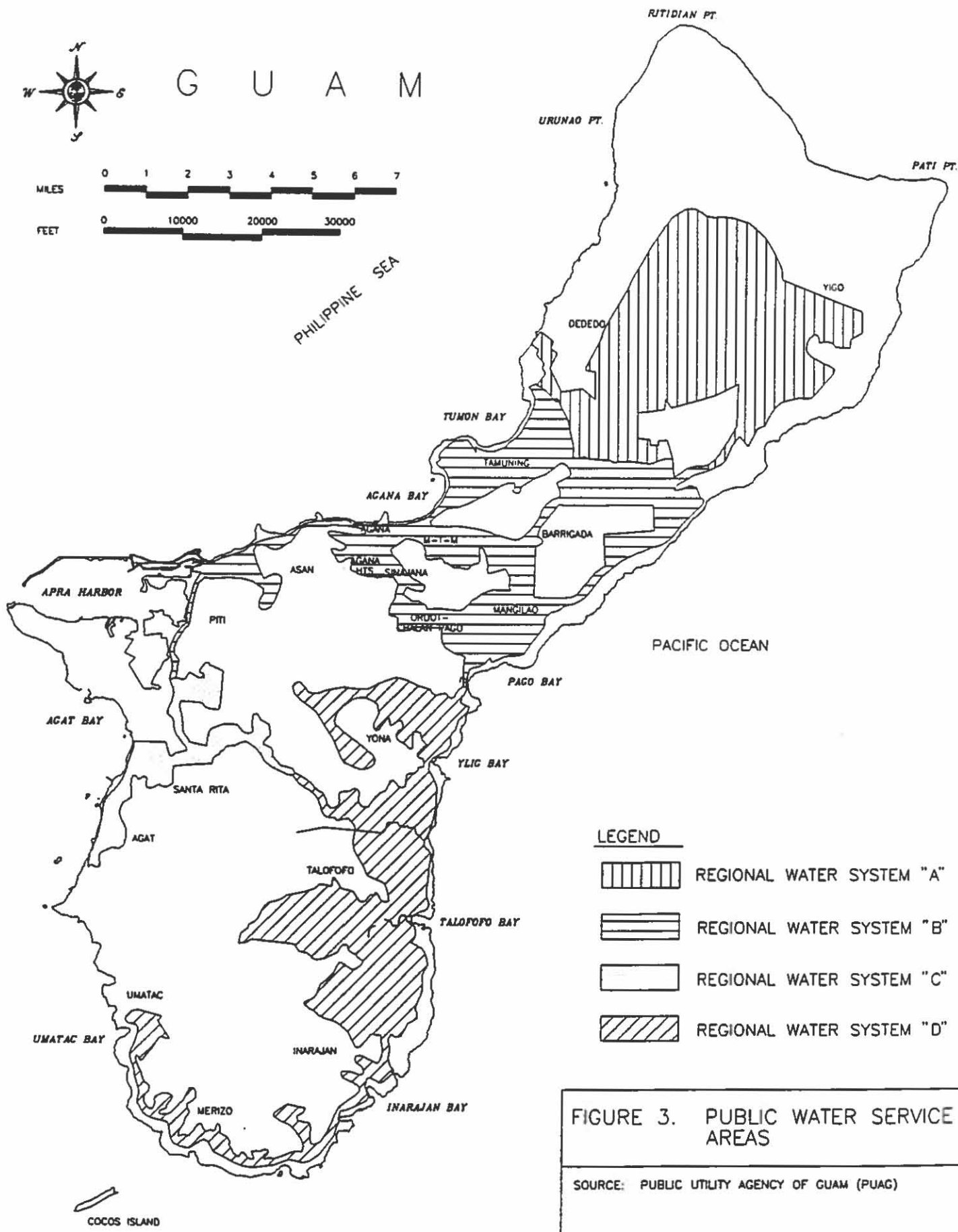


FIGURE 3. PUBLIC WATER SERVICE AREAS

SOURCE: PUBLIC UTILITY AGENCY OF GUAM (PUAG)

Guam is divided into four water service regions, "A" through "D" which are described as follows:

Regional Water Service "A", located in the northern portion of the island and including the communities of Yigo, Machanao (Agafa Gumas), Dededo, and Harmon Village, meets its water requirements through well production and purchased water from the U.S. Air Force. It contains no spring or surface supply sources.

Regional Water Service "B", situated in the north central portion of the island, includes the villages of Asan, Piti, Agana Heights, Sinajana, Chalan Pago-Ordot, Mongmong-Toto-Maite, Mangilao, Barrigada, and Tamuning, contains the Asan Springs facility. This facility, originally constructed in 1929, has a storage capacity of 30,000 gallons, and also includes several wells. Production pumps run continuously, supplying the Chaot Reservoir.

Regional Water Service "C", including the Agat-Santa Rita area, contains one major water facility, the Santa Rita Springs. This facility has a storage capacity of 105,000 gallons. Additional water requirements in this area are met by water purchased from the U.S. Navy via the Fena Reservoir.

Regional Water Service "D", serves the southern portion of Guam, including Yona, Talofofu, Inarajan, Merizo, and Umatac, and has historically been supplied by streams and springs for their water supply. However, most of these production facilities do not provide adequate treatment for available water supplies. Often, water pressure is inadequate due to power supply limitations and a lack of backup power supplies. Imported northern groundwater augments water supplies for the southern villages.

The Military Water System

The Navy's major water supply source is Fena Reservoir, located in the Naval Magazine area. This reservoir has a capacity of approximately 2.3 billion gallons. In addition, the Navy operates three wells in the Navy Communication Station - Finegayen area. In a 1956 agreement with the Government of Guam, the Navy committed itself to provide a portion of its water supply for Government of Guam use.

The northern groundwater lens is the Air Force's sole source of potable water. Their major facility is the Tumon-Maui well located in upper Tumon. Water is pumped to a reservoir in Dededo that has a capacity of 250,000 gallons. Additional wells are located in the Air Force Marbo Annex area and along Marine Drive. The Air Force and PUAG have discussed a trade in which the Air Force would acquire PUAG water from wells close to Andersen Air Force Base in exchange for its southern area sources, but an agreement has not yet been reached.

Water Consumption and System Capacity

The major problem with the water system, and the major reason for the system's reliance on the military supply for water supplements, is the unaccounted loss of large amounts of water. The primary cause for this loss (which may be as much as 30-40 percent of total water production) is the age of the water lines. Improvements to water lines along the island's roadways have been made as the roadway system has been upgraded. According to the 1990 Preliminary Water Master Plan Update, prepared by Barrett Consulting Group, the loss rate could be reduced to 15 percent by the year 2010 if comprehensive leak detection, meter maintenance, and water conservation programs are implemented.

Due to rapid growth over the last decade, annual water production (consumption plus water loss) has more than doubled - from four billion gallons in 1979 to almost nine billion gallons in 1989. The island-wide existing capacity of the PUAG system is more than 18 billion gallons. Current shortages are caused by the inefficiencies in the existing delivery system and are not due to a lack of available supply on the island. However, additional capacity will be required to meet the demand of pending and proposed major development projects.

According to the Guam Environmental Protection Agency, the northern water lens may have a production capacity of approximately 58-60 million gallons per day (mgd), while 1991 production is about 30 million gallons per day. Additional wells in this area will need to be developed in the future. However, past studies have suggested that the lens may be susceptible to significant saltwater intrusion if sustained yields reach 50 mgd. Approximately 18 mgd of yield from this lens is located under Andersen Air Force Base. PUAG does not have wells operating in this area of the island. Thus, the available supply to PUAG may only be in the 40-42 mgd range.

However, with significant additional yields, the potential for salt water to be drawn in and contaminate the groundwater (which supplies more than 80 percent of the overall water needs) is increased. An additional source of potential contamination is provided by the use, storage, and leakage of chemical substances anywhere that overlies the potable water supplies.

Two of PUAG's larger projects to develop new water sources for the island are, in the north, improvements to Yigo/Dededo water sources and, in the south, the utilization of the Ugum River as a reservoir. This reservoir is a primary surface water source for the Inarajan/Malojloj areas which began operating in late 1992.

PUAG has embarked in the identification of surface water alternatives and has contracted Barrett Consulting Group to conduct a Surface Water Study. The study, scheduled to be completed in late 1993, will provide a prioritization of surface water opportunities to supplement the potable water resources in the northern aquifer. These opportunities will focus on improving water service in the south and surrounding areas.

The development of surface water supplies has expanded over the last decade to a point where they have assumed a greater share of the overall water supply for the island. For example, in 1990 approximately 20 percent of the total island-wide water consumption was supplied by surface water supplies as compared to less than 10 percent of surface water supplies in the 70s. This trend is expected to continue as PUAG searches for other means to curtail the consumption rate from the northern aquifer and augment the total island-wide water supply with surface water sources from the southern areas of the island.

Nevertheless, the bulk of future sources are most likely to originate in the northern lens. Southern surface water sources are very expensive to develop, are particularly susceptible to droughts and are not seen as being as reliable as groundwater sources.

Residential users account for the largest share of water consumption. They consume 68 percent of PUAG's overall water demand. Commercial users account for the second largest group of consumers absorbing approximately 21 percent of total demand. Government and agriculture utilize the remaining 11 percent of average daily water consumption. (It should be noted that for the purposes of this breakdown of water use by type, hotel consumption is included in the commercial figures.)

The per capita level of service use, according to the Preliminary Water Master Plan Update, varies from 99 gallons per capita per day (gpcd) to 138 gpcd (excluding unaccounted-for water), with hotel water consumption estimated at a typical rate of 450 gallons per room per day. Golf courses are estimated to consume approximately 1,000 gallons of water per day for each hole. Based on the total number of existing, approved, and pending golf course holes (shown in Table 3), this would require approximately 387,000 gallons per day of additional water for irrigation purposes.

Wastewater Treatment and System Capacity

Sewage treatment services are provided by PUAG. There are eight major wastewater treatment plants that serve the island: the Agat, Agana, Baza Gardens, Umatac, Commercial Port, the Northern District (Dededo), and the Inarajan treatment plants. There is only one private wastewater treatment plant currently operating, this facility serves the Pago Bay Estates area. Fifty-five pump stations support this treatment system.

Public wastewater treatment service is provided to most of the more urbanized areas of the island. The service areas are shown in FIGURE 4. All of the existing treatment plants provide the minimal primary treatment process to effluent required by the U.S. Environmental Protection Agency. All plants have direct ocean outfalls except for Inarajan, which provides a land application process; Baza Garden, which discharges into a local stream that ultimately flows into the ocean; and Umatac, which also employs a land percolation process.

The rapid increase in population and hotel construction during the 1980s has, in some areas, overwhelmed the capacity of the wastewater collection and treatment system. Problems exist not only in the capacities of the treatment facilities to properly treat the effluent, but also in the capacities of the collection systems to transmit the flow of wastewater to the treatment plants.



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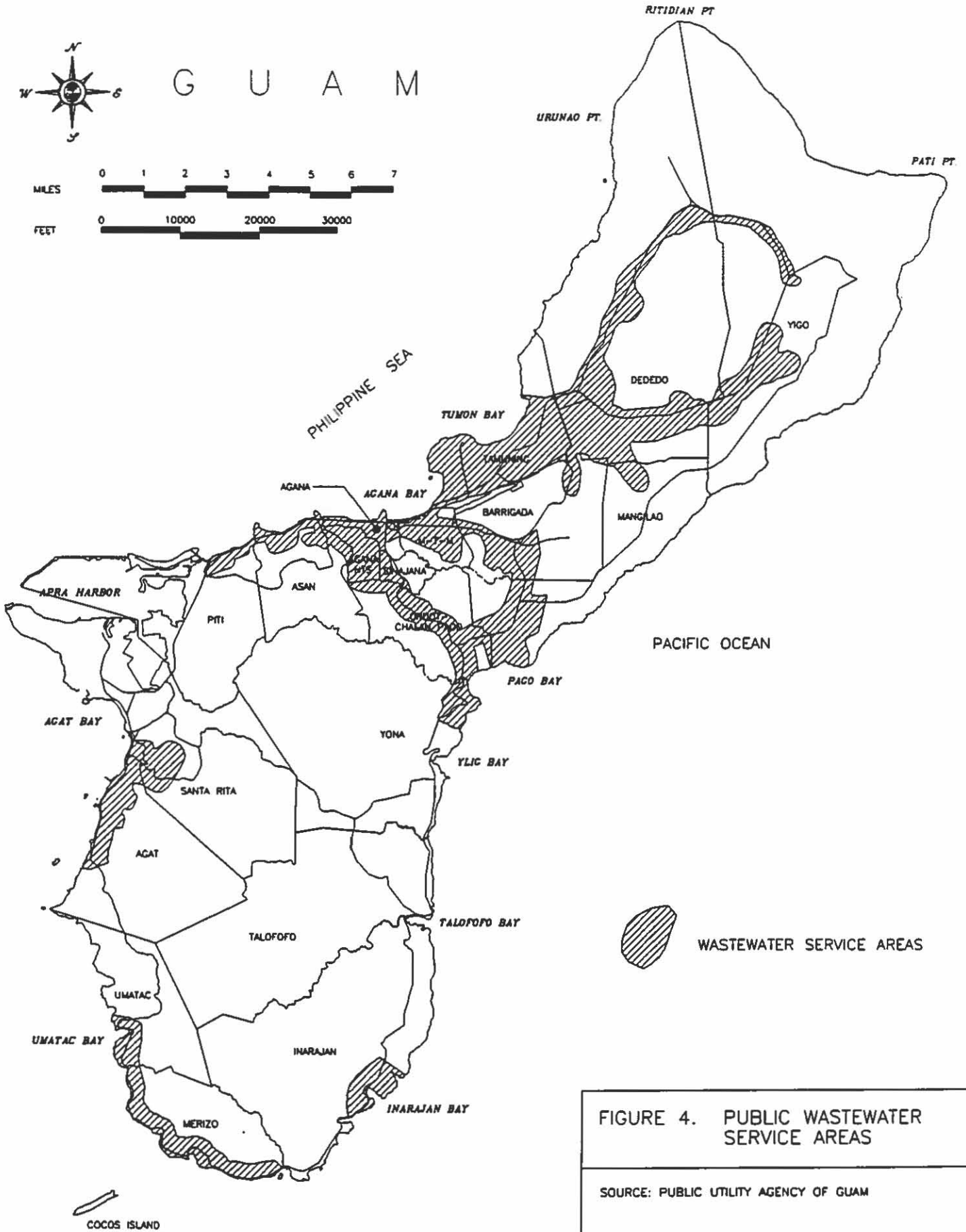


FIGURE 4. PUBLIC WASTEWATER SERVICE AREAS

SOURCE: PUBLIC UTILITY AGENCY OF GUAM

This is especially true in the Tumon-Tamuning area, where untreated or poorly treated sewage effluent has overloaded the collection system and periodically overflowed onto streets and ultimately into the coastal waters of Tumon Bay. The problem was compounded during periods of heavy rainfall, when infiltration and inflow of stormwater into the collection lines quickly exceeds the capacity of the pipes. This situation has been alleviated through the Northern District Sewage Reversal Project. This process entails transferring the sewage flow from the Tumon-Tamuning area which flowed to the Agana plant, operating far above capacity, to the under-utilized Northern District wastewater treatment plant. More than three mgd of wastewater has been diverted to flow to the northern plant. The Agana plant is now operating at 75 percent of its capacity.

Another problem area is the Agat wastewater plant, currently operating well beyond its design capacity. The situation is exacerbated by significant inflow from stormwater on wet days and infiltration from groundwater caused by tree roots breaking the pipes. Localized flooding problems around the Umatac and Inarajan treatment plants frequently result in failure of the land application effluent disposal process, which increases the discharge of poorly treated effluent to coastal waters. Degraded water quality has been documented in areas served by ocean outfall points, including Agana Bay, Tanguisson, Apra Harbor and Agat.

It is recommended that when average daily flows reach 90 percent of treatment plant design capacity, no further development be allowed to connect into the plant system. This guarantees at least a 10 percent reserve capacity to treat potential fluctuations in flow rates. Based on this standard, the Agat and Commercial Port facilities are already at capacity, while the Agana and Umatac treatment plants have limited remaining capacity to handle significant additional growth, as indicated in *Table 5*.

**TABLE 5
PUBLIC WASTEWATER TREATMENT PLANTS**

TREATMENT PLANT	DESIGN CAPACITY	CURRENT TREATMENT (AVERAGE DAILY FLOW) (GPD)	TREATMENT/CAPACITY RATIO
Agat	750,000	1,200,00	160%
Agana	12,000,000	9,000,000	75%
Baza Garden, Talofofu	600,000	200,000	33%
Umatac	500,000	400,000	80%
Commercial Port	20,000	20,000	100%
Northern District	12,000,000*	6,000,000	50%
Inarajan	91,300	40,000	44%
Naval Station	3,200,000	---	---
TOTAL	29,161,300	16,860,000	

Note: * Approximately 4 mgd of capacity at the Northern Plant is reserved for military needs.

Source: Public Utility Agency of Guam, 1991 and the U.S. Navy (Ralph Mesa), 1993.

An increase in development proposals in areas not currently serviced by PUAG (for example, Talofof, Yona, and portions of Mangilao) has resulted in many of these projects being allowed to develop individual wastewater treatment plants to serve individual developments. However, this will make eventual connection of these developments into a centralized wastewater treatment system more difficult and costly.

The amount of treated effluent is based on daily flow levels through the plants. Actual measurements of flows through the system are difficult to ascertain. However, general engineering standards estimate that between 80 and 90 percent of water consumption is returned through the wastewater collection system as effluent. Both PUAG and GEPA estimate that approximately 85 percent of metered water consumption returns through the wastewater collection system. Applying this standard to the range of per capita metered water consumption rates identified by the Water Master Plan Update (99-138 gpcd) yields an estimated wastewater treatment level-of-service range of 84-117 gpcd for planning purposes.

The amount of wastewater treated in the last three years has grown from an average of almost 13 mgd in 1989 to almost 17 mgd in 1991, while total treatment plant capacity has remained unchanged at approximately 26 mgd, as shown in Table 5. A faster than expected growth rate has outpaced the availability of new treatment facilities and, based on current trends, this is causing problems at the Agat and commercial port plants. PUAG is moving forward on a proposal for a new 9-12 mgd wastewater treatment plant in Agat to replace both the existing public facility and the Naval Station Wastewater Treatment Plant in order to upgrade effluent treatment to the secondary level. It is also likely that a new plant will be necessary to serve proposed development in the Mangilao and Pago Bay areas.

As the island continues to grow, the upgrading of the overall system will become increasingly important. PUAG's top priority future projects include the Baza Gardens Sewer Treatment Plant Modifications, Agat/Santa Rita Sewer System: Phase One, Agat/Santa Rita Sewer System: Phase Two, and the development of the Talofof Village Sewer System.

ENERGY

Existing Facilities

The Guam Power Authority, GPA, provides most of Guam's power supply. In 1992, GPA served 36,364 customers. Generation, transmission, and distribution facilities are operated by GPA and the Navy. According to an agreement made between the Navy and GPA, the Navy became a transmission level customer of GPA on August 1, 1992.

There are three existing GPA operated generation plants, Cabras, Tanguisson, and Dededo, one Navy-operated generation plant in Piti. Nine GPA substations, Agana, Apra Heights, Barrigada, Dededo, Harmon, Macheche, Talofoto, Tamuning, and Tumon, provide power to the island. Three new generation plants are being constructed in Dededo, Marbo and Manengon. The Dededo and Marbo plants are scheduled to be completed in February, 1994. The Manengon plant is being built by the developers of the Manengon Hills Resort Community and will be energized in March 1994, after which time the generator will be turned over to GPA.

Total energy consumption increased by over 68 percent from 1980 to 1990. Increased demand for power from residential and commercial growth generated a peak demand for 206 mega watts (MW) in 1990. In 1992, the demand peaked at 240 MW compared to the total system capacity of 307 MW.

Guam experienced unprecedented growth during the late 1980s into the early 1990s which translated into an increase demand for energy consumption. Without additional capacity added to meet this power demand, GPA's ability to maintain a consistent power supply was negatively impacted. During 1992, power outages were common due to maintenance problems with some power-generating units and the need for "load shedding" occurred during peak demand periods. Limited back-up power systems on-island pose problems when major generating units are unable to meet the demand, interrupting public, private and any operation dependent on power.

Based on projected population growth, increase in tourism and military development, GPA anticipates that the demand for electrical energy for future needs will require a new base load generating station on Guam. GPA's peak electrical load is over 240 MW. The load growth in 1989 -1991 was approximately eight percent per year. Projected forecast for 1992-1993 is expected to taper to a growth of six percent, with 1995 at 4.4% and 1996- 2000 at 2.6%.

Future growth is expected to stabilize at this rate for the next decade. In order for GPA to meet this demand without any interruptions in service, the power system should have a reserve capacity between 60 percent to 70 percent. The reserve capacity will make up the generation short-fall should the two 66 MW Cabras units be down simultaneously for any reason.

As mentioned, to meet the future power supply needs of the island and to replace the old facilities, GPA plans to build a new baseload generation facility. Efforts to identify potential sites for this new facility are underway. Because of the unique features of power plant facilities (i.e. resource requirements and waste production), determining a site must include these specific criteria as well as careful consideration of surrounding land uses.

GPA conducted a study to investigate potential sites for a new baseload generation facility. The study team made a preliminary selection of general sites south of Cabras Island along the coastal area of Rizal Beach and Facpi Point. These areas are identified and recognized in the I Tano-ta Land Use Plan to show the efforts of GPA to locate potential sites for a baseload generation facility needed for Guam's future energy needs.

Roadways / Mass Transit

There have been several proposals to deal with the rapid increase in traffic levels. These include the widening of existing roads, constructing new roads, as well as considerations to reroute traffic flows. The most significant of the proposals is probably the development of the Cross-Island Expressway, an idea that has been talked about for many years. However, to truly come to grips with traffic problems, it will be necessary for the adoption and implementation of a Land Use Plan that calls for less reliance on the private automobile. To simply widen and improve roadways does not really solve traffic problems. In the final analysis, it only perpetuates them.

Functional Classifications of Streets and Highways

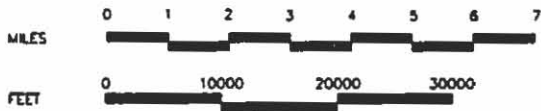
Guam's street and highway network is divided up into four types of roadway: trunk highway, major highway, minor highway, and collector road. A trunk highway, such as Route 1 (Marine Drive), connects major population centers and traffic generators and carries large volumes of traffic for long distances. A major highway, including Routes 7A and 10, connects major population centers and traffic generators to small population centers and carries moderately high volumes over long distances. A minor highway, Route 4, for example, from Umatac to Yona, connects smaller communities and traffic generators to trunk and major highways and carries moderate volumes of traffic. A collector road, such as Routes 14 and 14A, links traffic from residential, industrial, hotel, and institutional areas to trunk, major, or minor highways and generally carries light to moderate volumes. *Table 6* below describes the island's existing street and highway network by road classification and number of lanes.

Traffic Management

An island-wide Highway Master Plan was undertaken in 1991 - 1992 by the Department of Public Works (DPW). The Highway Master Plan will recommend specific improvements necessary to maintain an efficient level of service for the Territory's roadways. 1991 Average Daily Traffic Counts (compiled by DPW) are shown in **FIGURE 5** and indicate some of the existing conditions found on Guam's highway network.

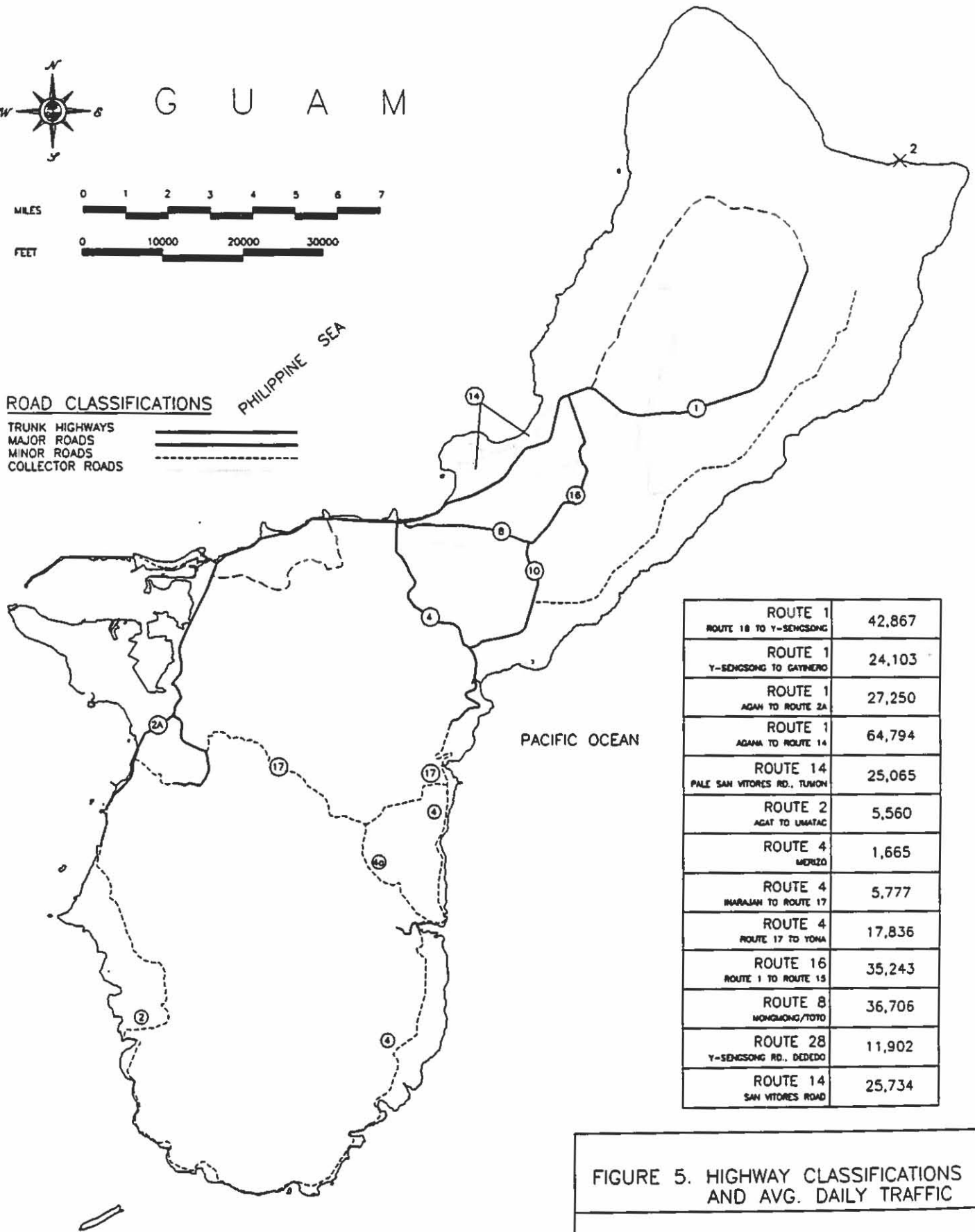


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ROAD CLASSIFICATIONS

TRUNK HIGHWAYS
 MAJOR ROADS
 MINOR ROADS
 COLLECTOR ROADS



ROUTE 1 ROUTE 18 TO Y-SENSONG	42,867
ROUTE 1 Y-SENSONG TO GAYBERO	24,103
ROUTE 1 AGAN TO ROUTE 2A	27,250
ROUTE 1 AGANA TO ROUTE 14	64,794
ROUTE 14 PALE SAN VITORES RD., TUNON	25,065
ROUTE 2 AGAT TO UMATAC	5,560
ROUTE 4 MERZO	1,665
ROUTE 4 BARAJAN TO ROUTE 17	5,777
ROUTE 4 ROUTE 17 TO YONA	17,836
ROUTE 16 ROUTE 1 TO ROUTE 15	35,243
ROUTE 8 MONGMONG/TOTO	36,706
ROUTE 28 Y-SENSONG RD., DEDEDO	11,902
ROUTE 14 SAN VITORES ROAD	25,734

FIGURE 5. HIGHWAY CLASSIFICATIONS AND AVG. DAILY TRAFFIC

SOURCE: DEPARTMENT OF PUBLIC WORKS

**TABLE 6
ROAD CLASSIFICATIONS AND LANES PER ROAD**

ROAD	NUMBER OF LANES
Trunk Highways:	
Route 1 (Santa Rita to Agana)	4
(Agana to Dededo)	6
Major Highways:	
Route 1 (Dededo to Yigo)	4
Route 2A	2
Route 2 (through Agat)	2
Route 4 (through Yona)	4
(Yona to Route 10 [Chalan Pago])	2*
(Route 10 to Route 7A [Agana])	4
(Route 7A to Route 1 [Agana])	6
Route 5	2
Route 10 (Chalan Pago to Barrigada)	4
Route 11	3**
Route 16	4
Route 7	2
Route 8 (Route 1 [Agana] to Route 7A [Maite])	4
(Route 7A [Maite] to Bunny Hardware [Maite])	6
(Bunny Hardware [Maite] to Route 10 [Barrigada])	4
Rt. 7A (Route 7 [Agana Hghts.] to Latte Stone Park)	2
(Latte Stone Park to Route 4 [Agana])	4
(Route 4 to Route 8 [Maite])	3**
Minor Highways:	
Route 2	2*
Route 4 (Umatac to Yona)	2
Route 3	2
Route 9	2
Route 12	2
Route 4A	2
Route 17	2
Route 6 (Route 1 (Piti) to Nimitz Hill [Asan])	4
(Nimitz Hill to Route 1 (Agana))	2
Route 15	2
Route 27	2

TABLE 6 (continued...)	
ROAD CLASSIFICATIONS AND LANES PER ROAD	
ROAD	NUMBER OF LANES
Collector Roads:	2*
Route 10A	6
Route 14 (Route 1 [Tamuning] to Flores Circle) (Flores Circle to Route 1 [Upper Tumon])	4
Route 14A	2
Route 14B	2
Route 30	2
Route 30A	2
Route 29	2
Route 32	2
Route 33	2
Route 34	2
Route 28	2
Route 26	2

Note:
 * Does not include center turn lanes.
 • Climbing lanes provided on uphill sections.
 ** Two eastbound lanes; one westbound lane.

Source: Department of Public Works and Wilbur Smith Associates, Oct. 91.

The most heavily travelled routes are located in the most heavily urbanized areas of the island (as is to be expected) and include:

- Marine Drive (Route 1) between Agana and Tamuning, where approximately 60,000 vehicles - or about 60 percent of the total number of vehicles registered on Guam in 1990 - travel through this section on a daily basis.
- Marine Drive (Route 1) between Asan and Piti, where almost 30,000 vehicles pass through every day.
- San Vitores Road (Route 14) in Tumon, which handles more than 25,000 vehicles per day.
- Route 8 in Mongmong-Toto, which experiences almost 25,000 vehicles per day.
- Route 16 from Barrigada to Mangilao, which funnels more than 21,000 commuting vehicles every day to and from work places in Agana and Tumon-Tamuning.

The northern section of the island is also experiencing a significant traffic increase, most notably in Yigo on Marine Drive (Route 1), where over 18,000 vehicles pass through the area daily, and in Dededo on Route 28 (Y-Sengsong Road), where approximately 12,000 daily vehicle trips have been recorded.

Proposed development in Mangilao and Yona will place additional demand on expanding Route 4, which currently serves more than 11,000 vehicles per day but is projected to increase significantly over the next ten years.

The least traveled routes are in the southern sector of the island, including the Agat/Umatat Road (Route 2), which recorded less than 3,000 daily vehicle trips, and Route 4 in Merizo, which experienced only 2,000 daily trips.

A series of improvements to the island's circulation system are planned by DPW. These projects include the construction of new access roads in areas of Agat, Yigo, and Inarajan, the reconstruction of several roads, including San Vitores Road in Tumon, new sidewalks in the areas of Agat, Dededo, and Chalan Pago-Ordot, new signalization and streetlights on various streets, and maintenance of roadways island-wide.

Mass Transit

Guam's mass transit system, the Guam Mass Transit Authority (GMTA), was created in 1985. As of 1990, the GMTA has 14 buses running five scheduled bus routes serving the 19 villages. 1990 ridership was approximately 103,000 people comprised of the following groups: 42 percent elderly, 33 percent full fare passengers, three percent children, 21 percent handicapped, and one percent students. The system's cost is \$0.99 per mile for the operation of nine vehicles compared with the U.S. average of \$0.72 per mile.

GMTA's future plans for expansion include a feasibility study for a monorail in the Tamuning-Tumon area, island-wide bus shelter construction, and a bus transportation center.

Other important components of Guam's mass transit system are the taxis, tour buses, and shuttles (operated by tourist-oriented commercial and entertainment outlets), which provide tourists with other transportation options throughout the island.

Public Safety (Police, Fire, and EMS)

Police Services

Three police precincts serve the island, including the Southern precinct located in Agat, the Central (main) precinct located in Agana, and the Northern precinct located in Dededo. There are two substations, styled after a Japanese "Koban", located in Tumon on Hotel Row and Farenholt, Camp Watkins. Future plans for expansion include new "Koban"-type police boxes in Chalan Pago-Ordot, Mangilao, Yona, and Inarajan, and new substations in Dededo, Talofofo, Agat, and Tamuning.

According to the Guam Police Department, Guam's 1990 crime statistics are well below those of comparable sized cities on the United States mainland. The 1990 crime rate generally kept pace with the island's population increase. The population grew 2.7 percent from 1989, while the Uniform Crime Report (UCR) rate grew 2.4 percent per 1,000 population increase. Total crimes have risen slightly from 1985 to 1990 while violent crimes generally held steady. Crimes such as rape and assault increased, while the murder rate decreased.

At present, there are 330 officers in the Guam Police Department serving a total resident population of 133,152. This reflects a level of service of 2.8 police officers for every 1,000 permanent residents.

Adult Correction

The Department of Correction's Adult Correction Facility is located on Dairy Road in Mangilao. The facility has a design capacity of 78 inmates. In 1992, the facility was far beyond capacity with 223 individuals imprisoned. The Department has initiated the introduction of a bill into the Guam Legislature to study the feasibility of a new facility.

The new study will identify alternative sites for the facility. The area where the existing facility is now located continues to experience an increase in its residential population. Community residents have expressed grave concerns over the increasing prison population and for the facility to be located to an area that is less populated.

Youth Correction

Youth Correction is administered by the Department of Youth Affairs at their facility in Mangilao. The Youth Correction Facility is badly outdated and overcrowded, according to the Department. The existing facility has a design capacity of 24 male beds and 18 female beds. During peak periods, the facility houses double the design capacity (approximately 50 males and 40 females).

A master planning effort is currently underway and a major new facility is proposed. Construction was tentatively scheduled to begin in 1992. The new facility will have a capacity for 100 males and 60 females. The new facility is proposed to be built at the same location as the existing one, although other sites are being sought for possible consideration. Other youth correction facilities include two small cottage homes in Talofofo (one housing eight males, the other accommodating eight females) and three sanctuary shelters (two in Mangilao and one in Dededo) serving 31 clients.

Fire Protection and Emergency Medical Services

The Guam Fire Department serves the island with eleven fire stations. There are 273 certified firefighters in the Fire Department with 17 additional firefighters to be added in the near future. With a 1990 total resident population of 133,152 this translates into an existing level of service of 2.18 firefighters for every 1,000 residents.

There are two civilian search and rescue facilities on Guam - one at the Agana Boat Basin and the second at the Agat Marina. Emergency Medical Technicians and ambulance services are housed and dispatched out of the fire stations. There are nine active ambulances and two on standby status.

Future plans for expansion include a fire station in Yigo, near Anderson Air Force Base, on Route 3. This station would serve the proposed 1,000 unit Astumbo community housing project.

In addition to the facilities and services described above, federal fire and emergency services are available and have been used extensively for civilian emergencies. These services include U.S. Coast Guard, Navy, and Air Force personnel.

All firefighting on the island's military property is performed by either federally employed civilian or military firefighters. Guam's Fire Department personnel do not provide these services to military bases.

Schools

The delivery of educational services is one of the most important responsibilities the Territorial Government has to its citizens. Providing the opportunity for an adequate education has become one of the foundations for sound economic development policy. Producing a work force with the educational background to compete locally (Guam), regionally (Micronesia), nationally (United States), and internationally (Asia), will be one of the great challenges facing Guam during the next decade. Attending the University of Guam or other U.S. universities after completing compulsory elementary and secondary education is one of the most advantageous opportunities available to many young residents. Job skills,

vocational training, and higher education opportunities all rely on a fundamental quality public education system at the elementary and secondary level.

There are 34 public schools, 23 elementary schools, six middle schools, five high schools, and one special education school located on the island. The public schools are under the jurisdiction of the Department of Education and the Territorial Board of Education. Many of the public school facilities in Guam are illustrated in FIGURE 6.

Immigration to the island has taxed the school system to the point where classroom overcrowding has been recognized as a significant problem. Responding to this problem, a new Central Elementary school is planned and two new high schools have been approved for construction, one for the northern sector of the island and one for the southern municipalities.

In the interim, numerous temporary classrooms have been constructed to meet the required student/classroom ratio. However, according to island residents, parents, students, and teachers, the problem is that the temporary structures tend to become "permanent". These temporary/permanent structures do not adequately meet the needs of the students and teachers and, furthermore, do not ease the strain on other school facilities, such as recreational facilities, cafeterias, and etc.

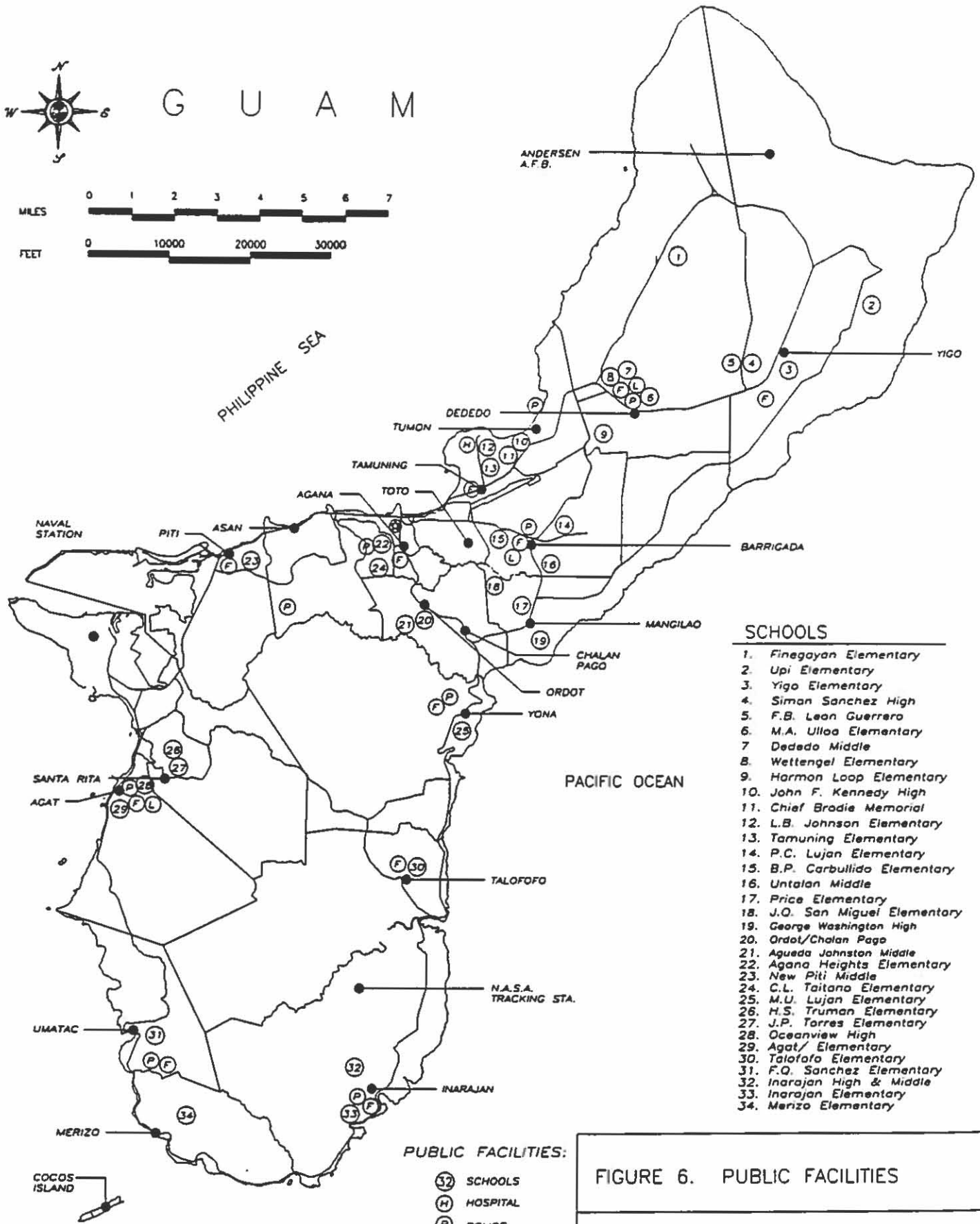
Public school enrollment has maintained a relatively stable population over the last five years. Total elementary and secondary enrollment topped 26,000 students in 1990. Projections from the Guam Department of Education indicate an increase to approximately 36,000 public school students by the year 2010.

The University of Guam and Guam Community College, both located in Mangilao, serve as the island's postsecondary institutions. The University offers programs in four different colleges: the College of Agriculture and Life Sciences, the College of Business and Public Administration, the College of Education, and the College of Arts and Sciences.

The University enrollment has exceeded 2,000 students during each of the past five years. The facility serves a wide range of students from throughout the Pacific Rim, including the U.S. mainland, Micronesia, the Philippines, Korea, Japan and China.



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SCHOOLS

1. Finegayan Elementary
2. Upi Elementary
3. Yigo Elementary
4. Siman Sanchez High
5. F.B. Leon Guerrero
6. M.A. Ulloa Elementary
7. Deededo Middle
8. Wettengel Elementary
9. Harmon Loop Elementary
10. John F. Kennedy High
11. Chief Brodie Memorial
12. L.B. Johnson Elementary
13. Tamuning Elementary
14. P.C. Lujan Elementary
15. B.P. Carbullido Elementary
16. Untalan Middle
17. Price Elementary
18. J.O. San Miguel Elementary
19. George Washington High
20. Ordot/Chalan Pago
21. Agueda Johnston Middle
22. Agana Heights Elementary
23. New Piti Middle
24. C.L. Taitano Elementary
25. M.U. Lujan Elementary
26. H.S. Truman Elementary
27. J.P. Torres Elementary
28. Oceanview High
29. Agat/ Elementary
30. Talofafa Elementary
31. F.O. Sanchez Elementary
32. Inarajan High & Middle
33. Inarajan Elementary
34. Menzo Elementary

PUBLIC FACILITIES:

- Ⓝ SCHOOLS
- Ⓜ HOSPITAL
- Ⓟ POLICE
- Ⓡ FIRE
- Ⓛ LIBRARY

FIGURE 6. PUBLIC FACILITIES

SOURCE: DEPARTMENT OF COMMERCE
DEPARTMENT OF EDUCATION

The Guam Community College is located immediately adjacent to the University of Guam. It offers a wide variety of programs, ranging from high school to adult extension and a two year college program. Recreational facilities are limited. The gymnasium, the major recreational facility at the college, is available to the public by prior arrangement only. Plans have been prepared for a new Community College campus near the site of the present facility on a 312 acre site owned by the Government. Detailed designs for the first phase of construction are expected to be completed in late 1993 or early 1994.

Starting in the 1970s, the increased demand for educational services resulting from immigration (especially other Pacific Islands and Southeast Asia), placed a tremendous burden on the Government's ability to provide schools, supplies, teachers, administrators, and support staff. Such has been the case that non-public educational services have helped to meet the demand for elementary and secondary education. As overcrowding spread out to many of the older public schools, the average classroom size increased, portable classrooms were rented or purchased, vandalism increased and the delivery of quality education was impacted. At the same time, socioeconomic factors were at work. A rise in the number of school-age children was experienced, especially those in single-parent households.

One consequence of this situation was that many parents began choosing non-public schools for their children. In 1980, non-public (i.e., private, parochial) school enrollment accounted for 12 percent of total student enrollment in the Territory. By 1990, the share of students attending non-public schools in Guam rose to 17 percent of the total student population. The fastest growing group in the private school sector were kindergarten and pre-school (day care) aged children.

Recreational Facilities

There are several different types of recreation and open space facilities on the island: national parks, territorial parks, natural preserves (which are to remain unimproved), conservation reserves (which can be improved to provide access to park users while still preserving natural features), historic sites, community parks, territorial recreation facilities, and community recreation facilities.

The national parks - the six parks designated as units of the "War in the Pacific National Historic Park" - are administered by the United States National Park System. These include the Asan Beach, the Asan Inland, the Mt. Tenjo/Mt. Chaochao, the Mt. Alifan, the Agat, and the Piti Guns Units. At the present time, the parks are not fully developed and not all have facilities available to the public.

The Territorial parks, natural preserves, conservation reserves, and historic sites come under the jurisdiction of the Department of Parks and Recreation. The remaining recreation facilities are managed by the appropriate village mayors. These parks and facilities are illustrated in Figure 7.

There are eleven major beach parks and numerous other scenic vista points and places of interest, including Ypao and Tanguisson Beaches in the north, and Talofoto, Saluglula, Merizo and Nimitz Beach Parks in the south.

Major projects planned by the Department of Parks and Recreation include the Dededo Sports Complex, the Inarajan boat ramp, a Speedway Park, and island-wide improvements to various sports facilities as well as Nimitz Beach in Agat. The expansion to the Paseo recreation area in Agana has been completed.

As Guam's population continues to grow, new parks will have to be provided. The following Department of Parks and Recreation standards apply to new subdivisions of twenty or more units. There are four major park types: play lots (2,500 sq. ft. to one acre in size), vest pocket parks (also 2,500 sq. ft. to one acre), neighborhood parks (five acre minimum size), and district parks (20 to 100 acres in size).

Parks should be provided at one acre per 50 dwelling units or one acre per 43,560 square feet of building. Generally, parks should be geographically centered to the greatest extent possible within the development to provide greater access to all dwelling units (unless beach property or some other significant natural feature is utilized).

All parks should be deeded in fee simple to the Government of Guam Department of Parks and Recreation. Recreational facilities, ranging from play and picnic areas to swimming pools and baseball diamonds, are also required. Locating a park adjacent to a school site, such as a neighborhood park next to an elementary school or a district park next to a junior or senior high school, allows a developer to count some of the school's recreational facilities towards park facilities requirements.

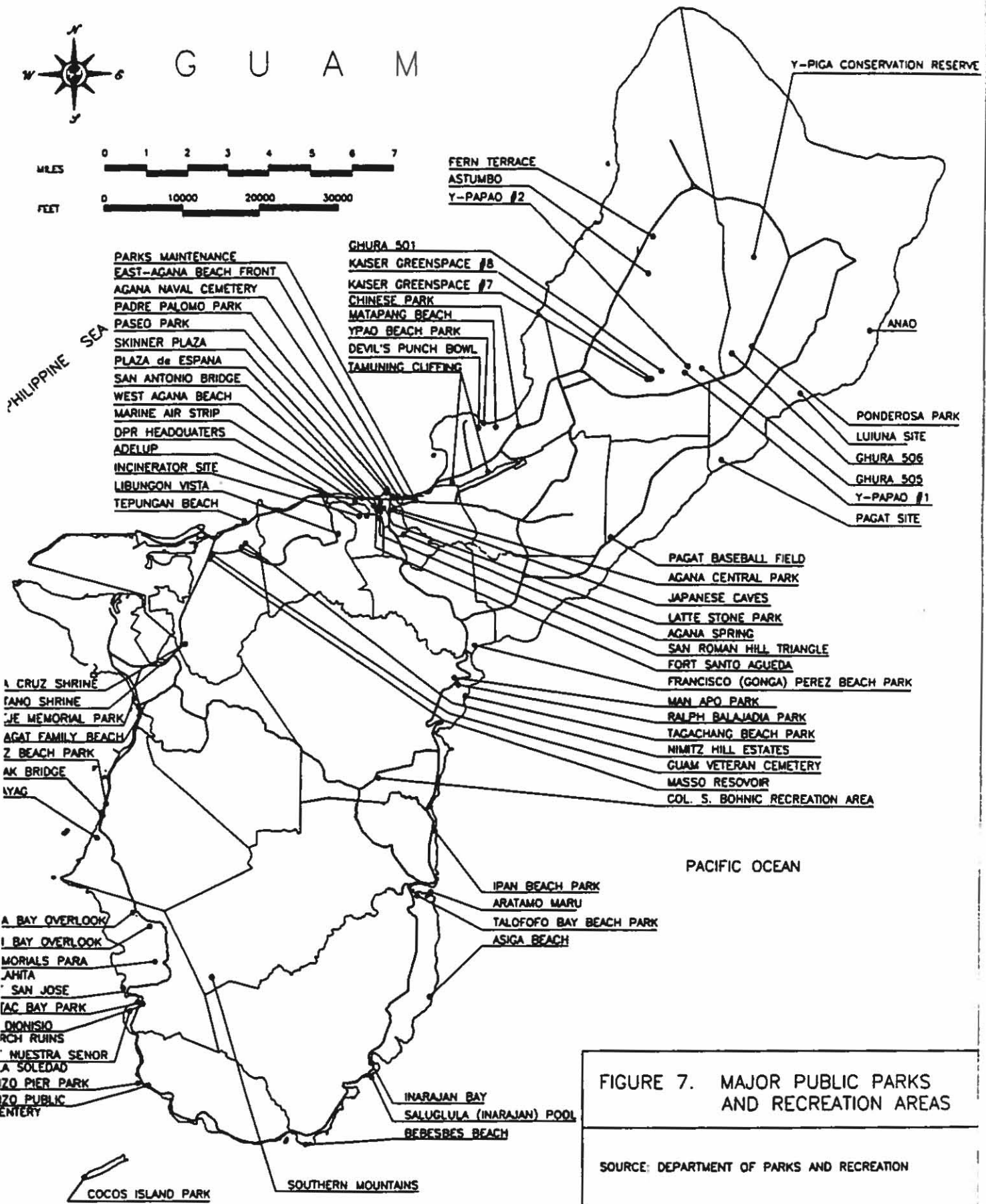
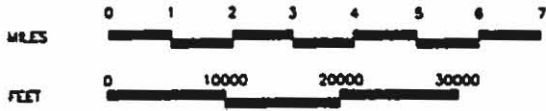
PORT FACILITIES

Airport

The Guam Airport Authority, GAA, oversees all non-military air operations at the Guam International Airport. The GAA currently leases portions of the airfield facilities from the U.S. Navy through the Naval Air Station air operations command. Recent efforts to turn over the entire naval facility to the Territorial Government are slowly reaching fruition and development pressures in and around the surrounding areas are becoming evident.



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- PARKS MAINTENANCE
- EAST-AGAÑA BEACH FRONT
- AGAÑA NAVAL CEMETERY
- PADRE PALOMO PARK
- PASEO PARK
- SKINNER PLAZA
- PLAZA de ESPANA
- SAN ANTONIO BRIDGE
- WEST AGANA BEACH
- MARINE AIR STRIP
- DPR HEADQUARTERS
- ADELUP
- INCINERATOR SITE
- LIBUNGON VISTA
- TEPUNGAN BEACH

- GHURA 501
- KAISER GREENSPACE #8
- KAISER GREENSPACE #7
- CHINESE PARK
- MATAPANG BEACH
- YPAO BEACH PARK
- DEVIL'S PUNCH BOWL
- TAMUNING CLIFFING

- FERN TERRACE
- ASTUMBO
- Y-PAPAO #2

- PONDEROSA PARK
- LUIUNA SITE
- GHURA 506
- GHURA 505
- Y-PAPAO #1
- PAGAT SITE

- PAGAT BASEBALL FIELD
- AGAÑA CENTRAL PARK
- JAPANESE CAVES
- LATTE STONE PARK
- AGAÑA SPRING
- SAN ROMAN HILL TRIANGLE
- FORT SANTO AGUEDA
- FRANCISCO (GONGA) PEREZ BEACH PARK
- MAN APO PARK
- RALPH BALAJADIA PARK
- TAGACHANG BEACH PARK
- NIMITZ HILL ESTATES
- GUAM VETERAN CEMETERY
- MASSO RESERVOIR
- COL. S. BOHNIC RECREATION AREA

- A CRUZ SHRINE
- TAMO SHRINE
- JE MEMORIAL PARK
- AGAT FAMILY BEACH
- Z BEACH PARK
- AK BRIDGE
- LYAG

- A BAY OVERLOOK
- I BAY OVERLOOK
- MORIALS PARA AHITA
- SAN JOSE
- IAC BAY PARK
- DIONISIO RCH RUINS
- NUUESTRA SENOR A SOLEDAD
- IZO PIER PARK
- IZO PUBLIC ENTRY

- IPAN BEACH PARK
- ARATAMO MARU
- TALOFOFO BAY BEACH PARK
- ASIGA BEACH

- INARAJAN BAY
- SALUGLULA (INARAJAN) POOL
- REBESBES BEACH

COCOS ISLAND PARK

SOUTHERN MOUNTAINS

FIGURE 7. MAJOR PUBLIC PARKS AND RECREATION AREAS

SOURCE: DEPARTMENT OF PARKS AND RECREATION

In anticipation of a final and complete reversion of NAS Agana to the local government, steps have been taken to initiate planning for various land use activities that would promote the goals and objectives of GAA, the purpose of the Land Use Plan for Guam, and the concerns of our entire island community.

The Proposed 5-year Zoning Plan for Guam delineates the various intensity districts as determined through the consideration of a study done by the Bureau of Planning, BOP and the GAA entitled, *The Recovery of Tiyan* as well as recommendations obtained from various TAC members and government officials. Much of the NAS Agana region is proposed to be included in Intensity District 8 which is the industrial district. Some reasons for this include:

1. the need for additional industrially zoned property
2. the need for airport expansion
3. the presence of existing support facilities for industrial uses
4. the desire to diversify Guam's economy and the benefits derived from siting traditional industrial activities such as transshipment, warehousing, and manufacturing in close proximity to a major port of entry.
5. the non compatibility of other alternative uses with a major airport.

A segment at the end of the runway clear zone is proposed to be included in Intensity District 1, Parks. The accident potential and sound impacts for the area are extreme and thus a program that discourages it's use may be most appropriate.

Much of the area currently used for housing at the edge of the tarmac on the Tamuning Cliff side is proposed to be Intensity District 8. The only exception will be the extreme southwestern portion which is in proposed for Intensity District 2, Low Intensity.

Much of what is currently barracks, recreation and support/administrative operations areas is included in Intensity District 2, Low Intensity. This would help provide some buffer between the industrial and airport activities and the residential limited commercial uses associated with Route 8 and the Barrigada Village. A small area designated intensity district 3 will take into account the existence of the Postal Service's main facility across from Radio Barrigada.

The objective of airport related land use planning and implementation is the achievement and maintenance of the compatibility between the airport and its environment. A careful balance of governmental actions is needed to:

- a. Ensure that the airport can maintain or expand its size and level of operations to satisfy existing and future aviation demands;
- b. Ensure that the people who live, work, or own property near the airport may enjoy the maximum amount of freedom from noise or other adverse impacts of the airport; and
- c. Protect the public investment of airport facilities for which there may be no foreseeable future replacement.

However, land use planning is only part of the answer to ensuring that these objectives are met. A key to all land use planning efforts is an effective zoning program which incorporates a set of performance standards that can govern the types and levels of use of properties surrounding the airport facility.

Seaport

Guam's only major seaport is under the jurisdiction of the Port Authority of Guam. The commercial seaport is located in the northern portion of Apra Harbor, and is the site of all non-military shipping facilities on Guam. The southern portion of Apra Harbor is home to the Naval Ship Repair Facility and other ancillary U.S. Navy operations.

The commercial seaport serves a very critical role for the island. It is the "bloodline" that delivers or imports the basic goods that feed, support and maintain the lifestyle which the island has adopted. It also serves as a major industrial park facility that provides transition services and facilities between the deliverer and the receiver of goods.

The Port Authority of Guam has also initiated major expansion efforts to accommodate the substantial increase of ocean traffic to Guam. A seaport masterplan was recently approved by the Territorial Planning Council and will comprise one of the elements of the overall comprehensive plan. Recent natural disasters has hindered these efforts somewhat, however, expansion plans continue to receive top priority in the port's future.

ENVIRONMENTALLY SENSITIVE AREAS

As in any insular environment, the land supply in Guam is finite. During the economic boom of the 1970s and 1980s, land was viewed as a commodity to be bought and sold through the market system. Where land was inexpensive, environmentally sensitive areas (such as wetlands) were usually bypassed. This was generally the development process, except in areas where the short-term economic return outweighed the environmental consequences. This has been true, for example, of floodplains and areas of good agricultural soils were relatively flat and dry land areas that are easily developable. As the demand for land increased with population growth and development, so did land values. Now, because land is expensive, it is more cost effective to build in areas by flattening, draining or filling them.

Most development proposals have been viewed with a strong belief in the market. If the economic benefits (in new jobs created and taxes generated) exceeded the cost, development generally proceeded.

Since that time, changing social values have increased the level of government intervention in the marketplace. The ecological consequences of development elevated the interest in environmental protection into the private and public decision-making process. Ecological value must now be considered alongside economic benefits, as well as social costs, in the future development of the Territory's finite land supply.

The necessity for governmental involvement in environmentally sensitive land comes from the essentially public character of these land resources. The destruction of environmentally sensitive areas does not mean just the possible loss of some "intrinsic" environmental values or benefits, but also loss to the social, cultural and economic welfare of the Territory.

Environmentally sensitive areas are land areas whose destruction or disturbance will immediately effect the life of a community by either, (1) creating hazards such as flooding and landslides, (2) destroying important public resources such as water supplies and the water quality of the coastal environment, or (3) wasting important productive lands and renewable resources, such as good agricultural lands. Each of these threatens the general welfare of the Territory and results in economic loss for everyone.

Too often, the impacts of development on residents of Guam are not adequately or appropriately considered. Economic growth is generally seen as a means of improving quality of life. The effects of economic change on specific aspects of social and cultural life have been left generally unexamined. The need to protect the natural environment is crucial to the people of Guam, Traditional cultural practices are dependent on the use of natural resources to perpetuate culture.

Local regulation is needed, not only because of the public character of the resources, but also because the real estate market does not adequately consider the costs and benefits of protecting these resources.

The functions of these environmentally sensitive areas are what economists call "public goods" -- if they benefit one person, they benefit all.

A wetland, for example, filters sediment and traps nutrients from upland runoff, thus cleansing water before it enters the aquifer or empties into the sea. These are important functions, but the landowner cannot sell this filtering capacity. If the land is providing a cleaner ocean for one man, it is providing it for all people who use and enjoy the ocean. Thus, in terms of maximizing profits, the landowner may be better off to develop the wetlands so that more land will be available to sell, but the larger community will then have to absorb the cost of lowered water quality. This example is particularly relevant to Guam.

Protecting these land areas involves important public costs and benefits that are inadequately considered by the normal market mechanisms. Therefore, it is logical that communities utilize their police powers to ensure a balance between the public interest -- the health, safety, and welfare of the community -- and the landowner's desire to use his property.

Guam is fortunate to be endowed with many natural resources. These resources contribute significantly to the islands' ecology, economy, and natural beauty, as well as its desirability as a place to live and visit. These features are important contributions to the quality of life. Certain areas or resources deserve special attention, for they are irreplaceable and their loss would deny future generations the benefits of their existence. Loss of a rare or unique resource, such as the loss of plant and animal species, implies man's disregard of the natural environment and its ecological processes.

In Guam, the retention of these ecologically sensitive areas, in addition to being environmentally and culturally proper, is also good business. Whether it is truly understood or not, all that the Territory has to sell is its environment. If the environment is degraded, so is the economic base.

Rare and unique natural areas have a value that is more than economic. These resources represent an intrinsic rather than a value-added economic base. As such, their economic return to the islands' is potentially greater and more stable, and, in some cases, economically indispensable. Fewer residents would stay and not as many tourists would visit the island if many of the waterfront areas were lost to overdevelopment or, conversely, lacked easy public access.

Natural areas also have important ecological values and serve as natural scientific laboratories. The study of natural sciences and the general understanding of the natural environment depend on these unusually rich areas. The coral reefs lying off the coast are some of the most complex, productive, and diversified ecological systems on earth.

In addition to ecological value, many environmentally unique areas, such as the limestone forest vegetation and mangrove mudflats, serve very important natural functions. The value of these areas for their drainage, soil retention, and natural habitat function is not replaceable. Mangrove stands serve as fish nurseries to enhance water quality and reduce degradation of coastal marine resources, such as coral reefs and seagrass beds, by acting to absorb the heavy impact of stormwater runoff, trapping sediments and filtering pollutants.

The rapid growth experienced in the Territory over the past 30 years and the potential for further encroachment of development onto significant natural areas have forced the issue of environmental preservation to the forefront of land-use planning. GovGuam and the citizens of the island face a turning point in deciding the importance of these areas relative to continued development. Whether these areas should be entirely preserved by inclusion in the Territorial Park System, protected to a limited degree from degradation by legal regulatory mechanisms, or allowed to incur development encroachment and the resulting impacts, must be resolved. The location of future land use activities outlined on the Land Use Plan maps and associated environmental performance standards serve as the venue for this process.

Wetlands

Wetlands are unique components of the island ecosystem. They are the swamps, marshes, mangroves, and river valleys. These are areas that are inundated or saturated near the surface and provide habitat for aquatic plants and animals. Many wetlands also act as a source of freshwater supply or assist in recharging the aquifer. They also provide a nursery ground for many juvenile animal species. Wetlands are one of the most biologically productive areas on the island. They provide a means for ridding surface water of sediments and pollutants. They provide aesthetic scenery and are valuable locations for scientific research and aquaculture development.

In areas on the coast, there is a transition from freshwater to saltwater wetlands with zonations of vegetation delineating the changes in salinity. A diversity of plant life is found in these areas, many of which assist in maintaining the balance of the habitat, supply nutrients to the water and have ethnobotanical value as food, medicine, or material culture. Wetland areas are often in floodplain areas and absorb excess overflow from rivers during periods of excessive rainfall.

The mangrove fringe, represented in only two locations on Guam, is not only an ecological habitat, but also functional as a shoreline stabilization mechanism preventing erosion during periods of storm wave inundation. Mangroves are particularly resistant to typhoon force winds. Numerous small reed marshes exist in inland savannah areas where surface drainage is slowed by level topography. Savannah marshes are mostly found in the Dandan, Sigua, Talofofu, and Umatac areas. Some unique salt marshes can also

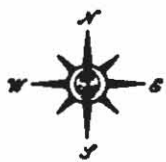
be seen at Sumay on federal lands. These small savannah and salt marshes can be identified by on-site field inspection and development should follow the performance guidelines for all wetlands.

Jurisdictional wetlands are identified on U.S. Fish and Wildlife National Wetland Inventory maps utilized by the Bureau of Planning, Department of Land Management, and Department of Agriculture. Using aerial photographs, wetlands were identified based on vegetation, visible hydrology, and geography. The aerial photographs typically reflected conditions during the specific year and season when they were taken. In addition, there is a margin of error inherent in the use of aerial photographs for wetland delineation. Thus, a detailed site survey and historical analysis may result in revision of the wetland boundaries. In addition, some small wetlands and those obscured by dense forest cover may not be included on the USFWS map documents. Forested and scrub-shrub wetlands are estimated to cover 2,346 acres of Guam while emergent wetlands encompass approximately 1,400 acres.

The following is a list of generalized areas where substantial terrestrial and estuarine wetlands are mapped on Guam. General wetland areas on Guam are shown in Figure 8.

- Agana Swamp
- Sasa Bay Mangroves and Marsh
- Atantano River Valley and Mangroves
- Abo Cove Naval Station Marsh
- Camp Roxas Naval Station Marsh
- Namo River Flood Plain
- Umatac Marsh
- Geus River Estuary
- Achang Bay Mangroves
- Ajayan River Estuary
- Agfayan River Estuary
- Inarajan River Estuary
- Talofoto River Valley
- Pago River Estuary

It should be noted that this list, and those wetland areas depicted on FIGURE 8, represent only substantial wetland areas. Many smaller wetland areas are included in the USFWS National Wetland Inventory maps.



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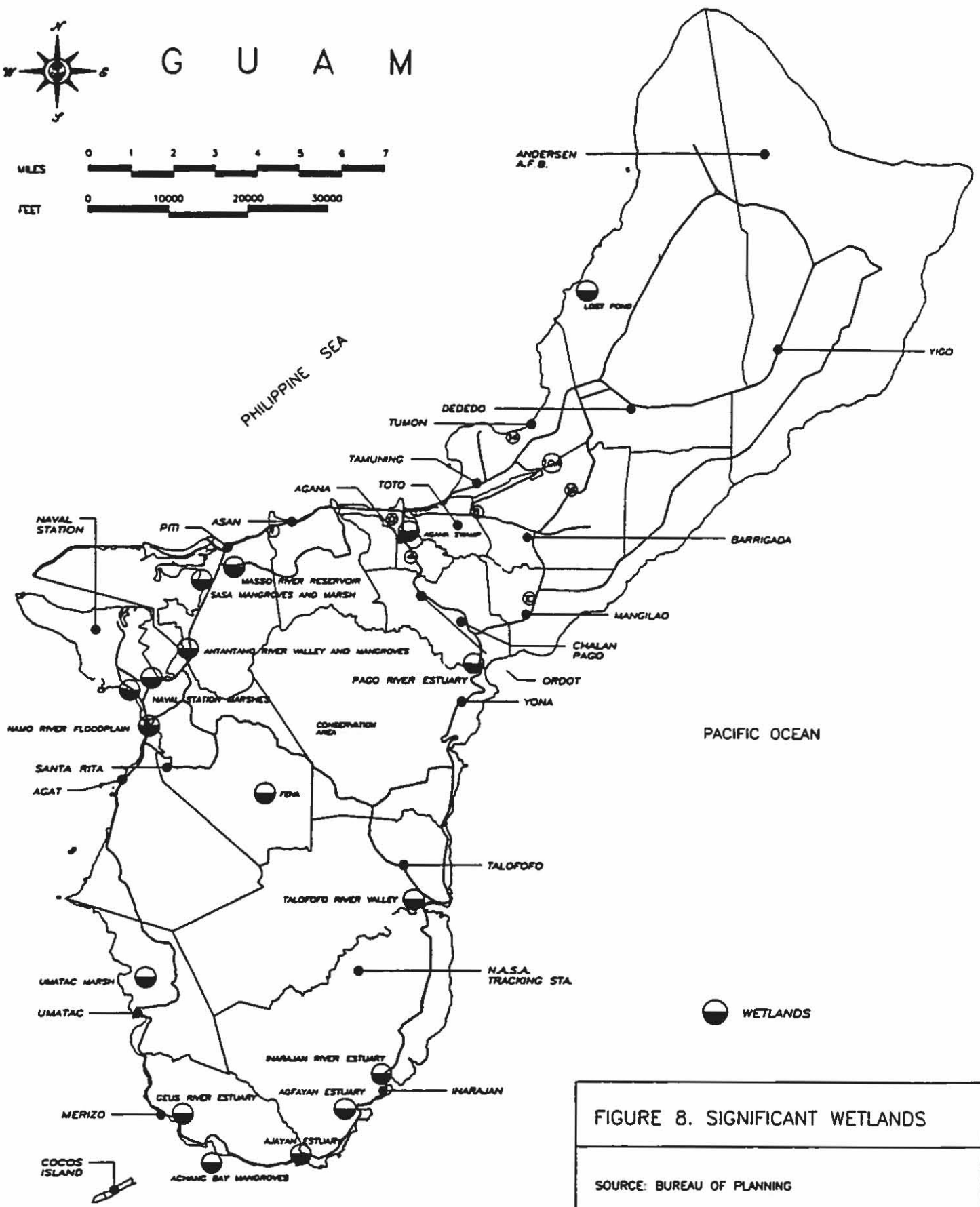
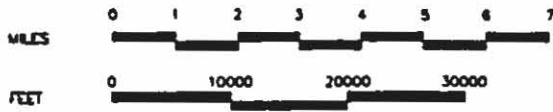


FIGURE 8. SIGNIFICANT WETLANDS

SOURCE: BUREAU OF PLANNING

Development adjacent to wetlands and including reefs should adhere to GEPA water and erosion control standards and be compatible with the nature of the wetland habitat. Similarly, developments within wetland areas should enhance wetland habitats and benefit the people of Guam, rather than cause irreparable damage to the finite amount of these environmentally important areas. Limited development can be allowed within wetland areas if the development results in no net loss of wetland habitat or if the environmental impacts are not significant and steps are taken to mitigate the impacts. Low impact development in wetlands include enhancement of nature trails or observation points. High impact development in wetlands include roads, stream crossings, bridges and buildings that require the placement of fill upon which to build.

Hazard Prone Areas

The devastating effects of major storms or typhoons with winds greater than 65 knots periodically occur in the Territory. Property losses that total in the millions of dollars due to high winds and flooding damage are frequently the result of these storms. The damage to homes, businesses and property is exacerbated, in many cases, where development has been allowed to take place in particularly sensitive areas subject to flooding from run-off, such as the mouths of drainage ways and floodplains; and shorelines or filled lands that are susceptible to inundation from tidal storm surges.

Guam is at substantial risk from earthquake hazards. As to be expected in an island setting, these risks include inundation of low-lying coastal areas by sea waves and liquefaction of sandy materials in areas of high water table, in addition to ground shaking. Of particular concern are steeply sloped hillsides, which are particularly susceptible to earthquake-induced land sliding. The rock is often fractured and weathered, which leads to increased hazard with time and rainfall. Slumping has occurred in some areas. Many slopes that have failed during previous heavy rains are also likely to fail in the event of a major earthquake.

The other critical areas are waterfront locations situated on loose alluvial soils or man-made fill. The performance of such materials in an earthquake are notoriously poor. The water soaked soils tend to amplify even weak ground motions, and they liquefy easily. The result is an increased susceptibility to damage in these areas.

Of significant concern is the low-lying and populated waterfront areas of Agana, Asan, Tamuning, Tumon Bay, Umatac, Merizo, and Inarajan. These areas are also endangered by sea waves generated by seismic activity elsewhere in the Pacific Ocean. Compounding the potential problems is the fact that many of these same areas are located on liquefaction-prone alluvial soils. Thus flooding, wave forces, settlement, and liquefaction are dangers in these areas, in addition to the effects of ground shaking vibration.

Floodplains and Floodways

As surface drainage patterns on steep slopes merge into rivers, the amount of water flow and concentration of sediments increases. The course of rivers inevitably leads to the ocean along the coastal lowlands. Dispersal of water over a floodplain area retains freshwater resources and some sediments are distributed and trapped over land areas rather than into the sea. At one time, floodplains were valued and utilized in the Territory as rich soil areas for wet crops such as rice.

Most flooding is associated with intensive rainfall in the inland valleys and coastal areas. Also, many coastal areas are vulnerable to flooding from storm surges associated with major typhoons. During periods of adverse weather conditions that bring persistent rainfall, the natural and developed drainage systems can overflow even further into adjacent flat terrain at the base of a drainage slope. The dispersal of flood water is often confined to natural wetland habitats, but in some cases, can overflow into developed areas and villages. If improperly used, floodplains can become problem areas because of the deterioration of flood-damaged structures. In addition, flood-damaged facilities cause recurring public expense for relief and repair of these structures. When floodplains are undeveloped, practically no flood damage occurs. However, because floodplains are level and level land is in high demand on Guam, much development has already occurred in flood hazard zones. Careful management of these areas can prevent damage and maintain their value for low intensity activities, scenic resources, open space, and for agricultural opportunities. Following is a list of the flood hazard areas on Guam:

- Southern Coastline from Pago Bay to Agat Bay
- Coastline from the intersection at the USO in Piti to Oca Point
- Togcha River
- Atantano River
- Namu River
- Salinas River
- Agat Area (Finile Creek, Gaan River, Auau Creek)
- Taleyfac River
- Telayag River
- Agaga River
- Sella River
- Cetti River
- La Sa Fua River
- Umatac River
- Madog River
- Bile River
- Pigua River

-
- Geus River
 - Agfayan River
 - Ugum River Valley
 - Talofoto River Valley
 - Togcha River
 - Ylig River
 - Pago River

Floodways on Guam are generally located along the southern perimeter of the island where less permeable volcanic formations create more stream and river flows. The approximately 100 square mile area of southern Guam is drained by over 30 streams emptying into the sea. These streams respond immediately to rainfall, swelling rapidly and declining quickly. Flows during the wet season are substantially higher than in the dry months. Most of the streams are reduced to a trickle at the height of the dry season and some have no flow. Drainage areas are relatively small, ranging from less than one square mile to a maximum of about 20 square miles for the Talofoto basin. The major streams drain areas that average between two and six square miles in size. Talofoto's average flow of 41 million gallons per day (mgd) is the largest. Figure 9 depicts the general areas that are considered to be flood hazard zones, according to the Federal Emergency Management Agency.

Performance guidelines for development in historically proven flood hazard zones seeks to prevent damage to property and the quality of human life. The U.S. Army Corps of Engineers is the primary agency involved in the delineation of flood hazard zones and undertakes projects for flood control. This is not only vital for the protection of both the environment and population, but also the economy as federally subsidized flood insurance requires local delineation and management of floodplain areas to be qualified for aid under the Federal Emergency Management Administration.

Existing urban development within flood hazard zones must be respected. However, proposed urban development within these areas should be planned so that land alteration does not increase the flood hazard zone (causing it to extend over adjacent, previously non-hazardous areas). In addition, development should be planned such that structures are flood resistant and the possibility of human injury due to flood conditions is negligible.

Several guidelines for floodplain management are proposed in the Land Use Plan:

-
- **Conservation and Management** - Floodplains require careful management to prevent damage that results from floods and to preserve their value as scenic, recreational, and agricultural resources. Floodplains provide significant areas of open space, serve as scenic buffers between incompatible land uses, and provide prime agricultural opportunities. To protect vegetation along natural streams and other water resources, preserve aesthetic values, and to prevent erosion and siltation problems, performance standards should be put into effect for development in these areas.
 - **Development** - Only low-intensity activities that do not obstruct the flood flow should be allowed in the floodplain. Replacement of undersized culverts should be undertaken to relieve backwater flooding. No public or private construction should be permitted in a manner that will materially increase the degree of flooding.
 - **Flood Protection Elevation** - The 100-year flood elevation increased by one foot is used for planning purposes as the flood protection elevation. The 100-year flood boundary encompasses lands that have at least a one in 100 chance of being inundated in any given year. Such boundaries are determined by Flood Insurance Rate Maps (FIRM), issued by the Federal Emergency Management Agency. These areas are, however, subject to change when development increases the magnitude and frequency of floods. In addition, the compilation of existing floodplain regulatory policies into a single floodplain protection performance standard should serve to better focus and regulate development within floodplains.

Steep Slopes

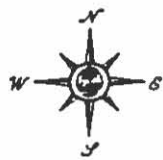
Steeply-sloped hill ridges are geologic features whose slopes and soils are in equilibrium with the vegetation, underlying geology, and the amount of precipitation. Intensive development of these areas can affect their natural function of absorbing rainwater, retaining soil and vegetation cover, and providing an aesthetic resource.

With few exceptions, large-scale development has not yet occurred on steep lands. In the future, however, the increase in population and demands for more housing (urban expansion) may create pressures for building on steep hillsides as development fills up the available level terrain, such as has occurred on Barrigada Heights. Often, home-builders and resort developers wish to take advantage of the vistas obtained from higher terrain. An historical preference for flatland as being more cost effective for development could change as a result of economic pressures for the use of land once considered marginal for development. As a result, new performance guidelines should be developed to ensure safe and environmentally sound development of steeply sloped areas.

Almost half of Guam's total area (43 percent) has topographic slopes in excess of 15 percent. Steep terrain generally occurs adjacent to the savannah grasslands of the southern half of the island and on coastal cliffs and terraces. Figure 10 depicts those areas of Guam with slopes of 15 percent or greater.

Due to a multiplicity of problems that can occur with land-use activity on hillsides and cliffines, open space is encouraged as the predominate land use in these areas. The majority of Guam Government-owned sloping terrain has been designated as park districts because the slopes and vegetation constitute a natural watershed, an aesthetic resource, and an important area for recreational activities, such as hiking and observation of ecological habitats. The vegetation, wildlife, drainage patterns, soil conditions, and underlying geology of steep areas all suggest an emphasis on open space rather than urban or agricultural development.

Construction on hillsides, which destroys protective vegetative cover, can promote erosion, limit land use, and degrade water quality and visual appearance. Unplanned development can also lead to landslides and an increase in flood hazard areas. The weight of structures on steep hillsides can cause unstable soils to slump, which weakens building foundations. In extreme cases, mudslides may cause building damage and/or a threat to human life. When ground cover is disturbed or removed during development, thereby exposing the soil, the potential for erosion is introduced. When the surface area available for absorption of rain water is reduced by impervious surfaces (roofs, roadways, parking lots, etc.), runoff is increased and the potential for erosion increases along with it.



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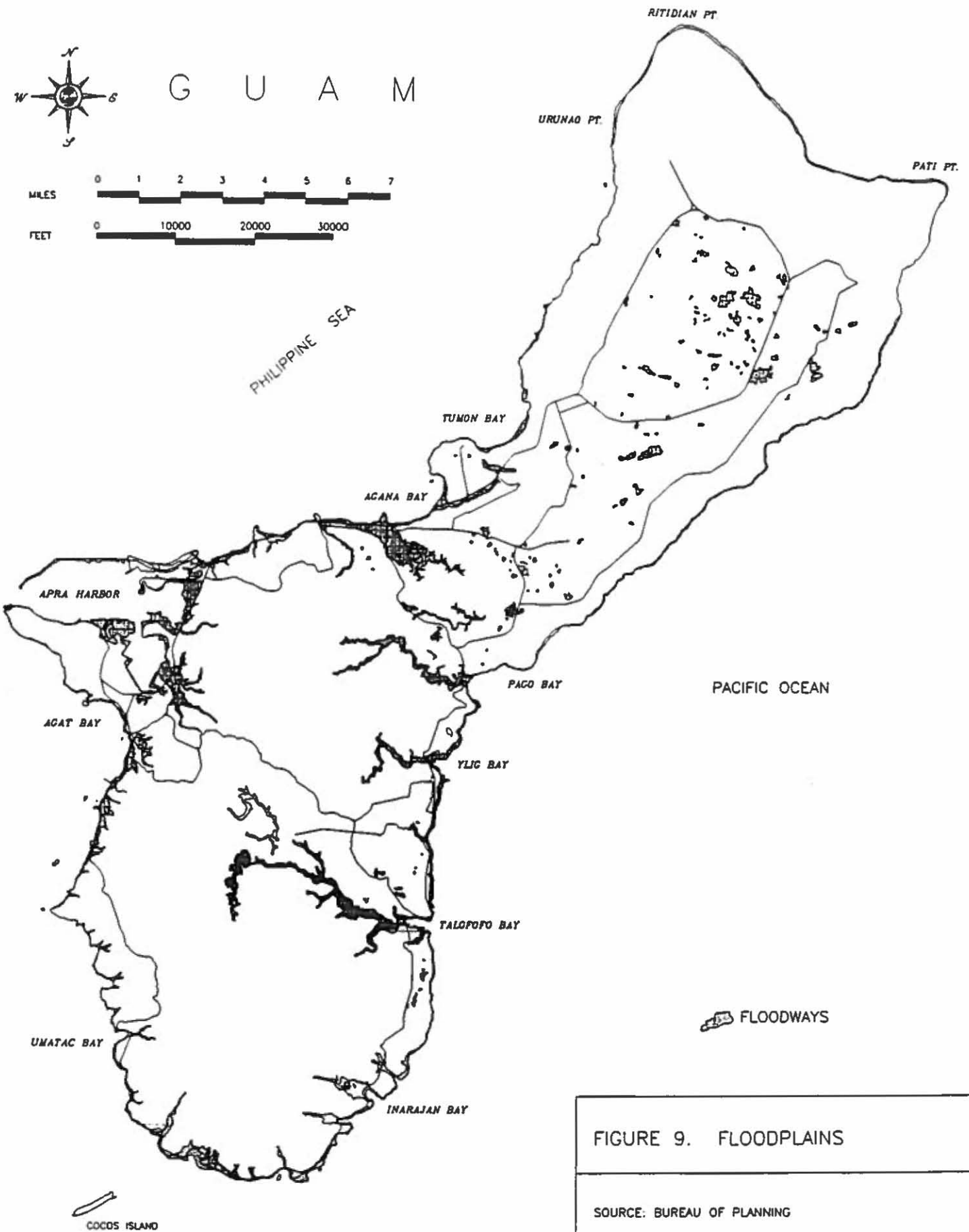
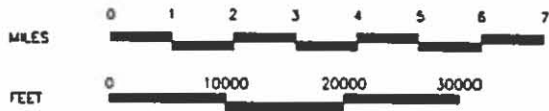


FIGURE 9. FLOODPLAINS

SOURCE: BUREAU OF PLANNING

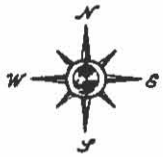
As a rule, steeply sloped areas are more easily eroded than level lands and the extent of erosion during construction and prior to stabilization is substantially increased on steep terrain. Septic tanks and leaching fields installed on steep slopes present more complex design considerations and have greater potential for failure than similar installations on more level ground. Where provision is made for public power, water, telephone, or sewage systems, the installations are more difficult and costs are significantly greater on steep slopes than equivalent installations on level ground. In addition, the acreage requirements for roads and structures increases on slopes. In short, land cannot be used as efficiently on steep slopes as on level land. Efficiency is related to cost and some of the cost of developing land on steep slopes must ultimately be borne by the public, since the local government must maintain roadways and other utilities when erosion, water sedimentation, or slide damage occur.

A general guideline for land use in slide and erosion zones is that all proposed and existing development should adhere to the erosion control standards established and enforced by GEPA. Hilltops should be avoided as building sites for urban development as the natural horizon line is interrupted and structures are unsheltered from typhoon winds. When it is necessary to build on sloping terrain, roads and other infrastructures should be planned to follow the contours of the site. Finally, when an area hazard study denotes unstable soils where potential landslides may occur, land use within the area should be restricted to low-population density activities, unless structural means of landslide protection are implemented.

Aquifer Recharge Areas

The underground aquifer systems of northern Guam provide the bulk of the island's freshwater supply. A layer of freshwater floats upon saltwater and forms a basal lens. The lens is replenished by rainfall percolation through the limestone of the northern plateau.

The limestone plateau located in northern Guam contains a moderately to highly permeable aquifer which rests on an eroded surface of relatively impermeable volcanic rock. The water table rises from sea level at the shore to heights of several feet above sea level in interior areas. It forms mounds near the northern end of the island and near the southern boundary of the limestone which occurs in central Guam. In the northern mound, there is an area of about 12 square miles in which a hill of volcanic rock, buried beneath the limestone, stands above sea level and, above the water table.



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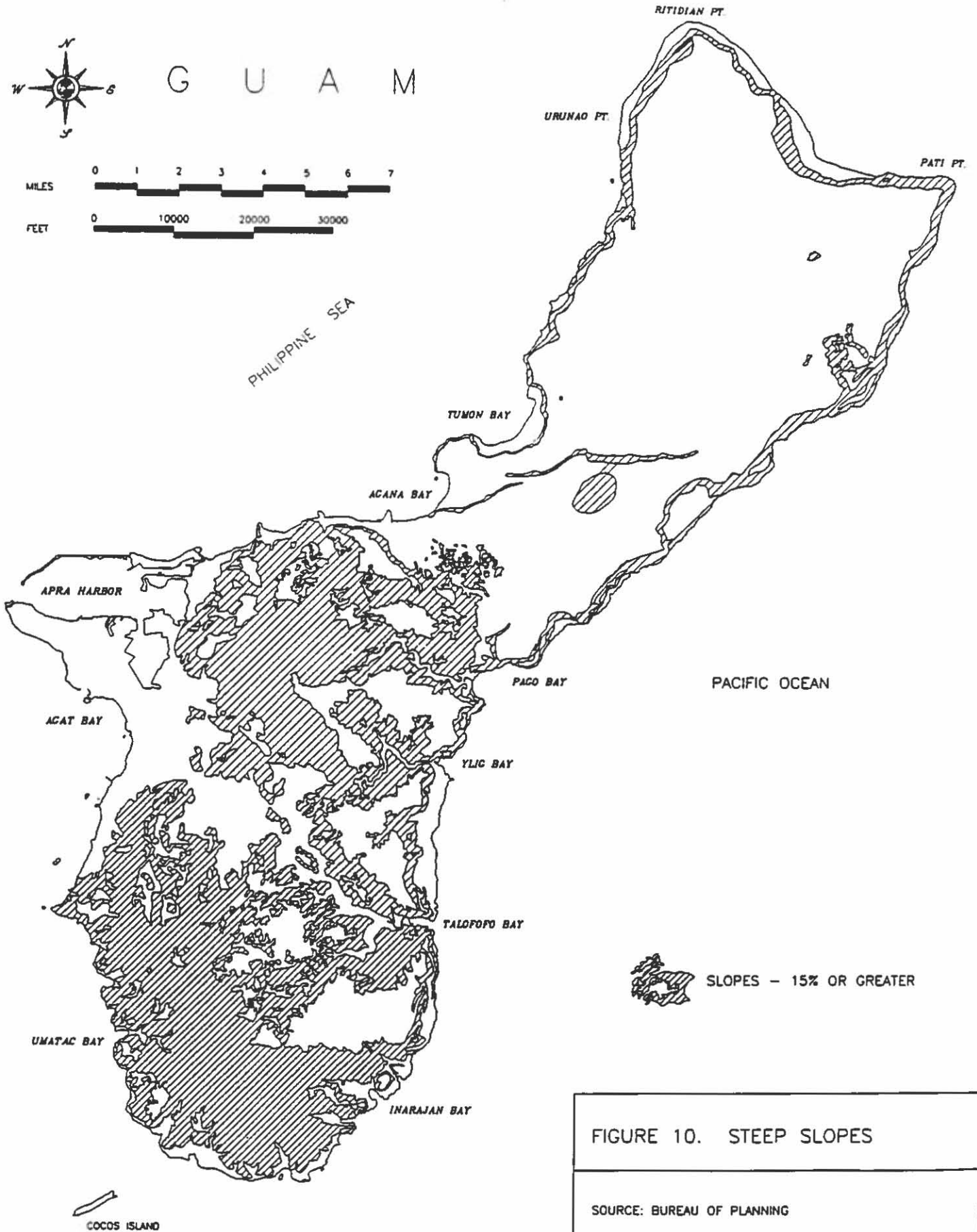
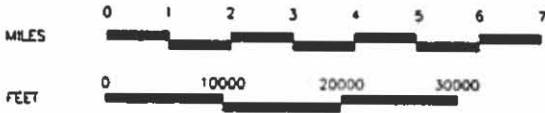


FIGURE 10. STEEP SLOPES

SOURCE: BUREAU OF PLANNING

It is assumed that there are three main aquifer areas - Dededo-Yigo, Barrigada, and Chalan Pago-Ordot in Central Guam. Forthcoming research may indicate that the three aquifer areas are interrelated. In the area over the two northernmost aquifers, numerous sinkholes cause rapid injection of water into the lens system. These areas are particularly critical in terms of pollution of underground supplies. Urban development often changes the character of portions of the land from the naturally pervious surface to man-made impervious areas. When this occurs over the aquifer recharge areas, ponding basins are sometimes needed to assist the rainwater recharging of the underground lens.

In the central Guam aquifer area, where southern volcanic uplands meet the northern limestone plateau, the topography is intersected by low-lying basins that appear as grassy fields which are flooded during periods of high rainfall in the wet season. These natural low-lying basins, like the northern sinkholes, assist in aquifer recharge. The groundwater recharge areas are depicted in Figure 11 in a generalized manner.

The issue of groundwater supply protection highlights the connection between land and water management. Human activities on the land significantly affect the demand, availability, and quality of groundwater resources. Effective conservation and protection of groundwater requires appropriate attention to land management. The Territorial Government, through its authority to regulate land use and development, has the opportunity to play a key role in the overall scheme of groundwater protection.

Many of the public, commercial, and domestic water wells are located in areas not necessarily of high aquifer recharge value. The movement of groundwater through underground geologic strata (e.g., cracks, fracture zones, faults, and loose alluvial deposits) often places it at a different end-point than its initial point of entry into the ground through the recharge process. Many of these wellfields are located in areas of intensive human development. They are often subject to contamination from adverse development impact, including pollution and over-pumping. Therefore, protection should also be given to existing and potential wellfield areas to preclude these impacts.

Traditionally, efforts to manage groundwater has been reactive, triggered only when problems occur. But, because of the nature of groundwater resources, negative impacts can be irreversible or prohibitively expensive to remedy. Prevention of contamination is one of the keys to effective groundwater management.



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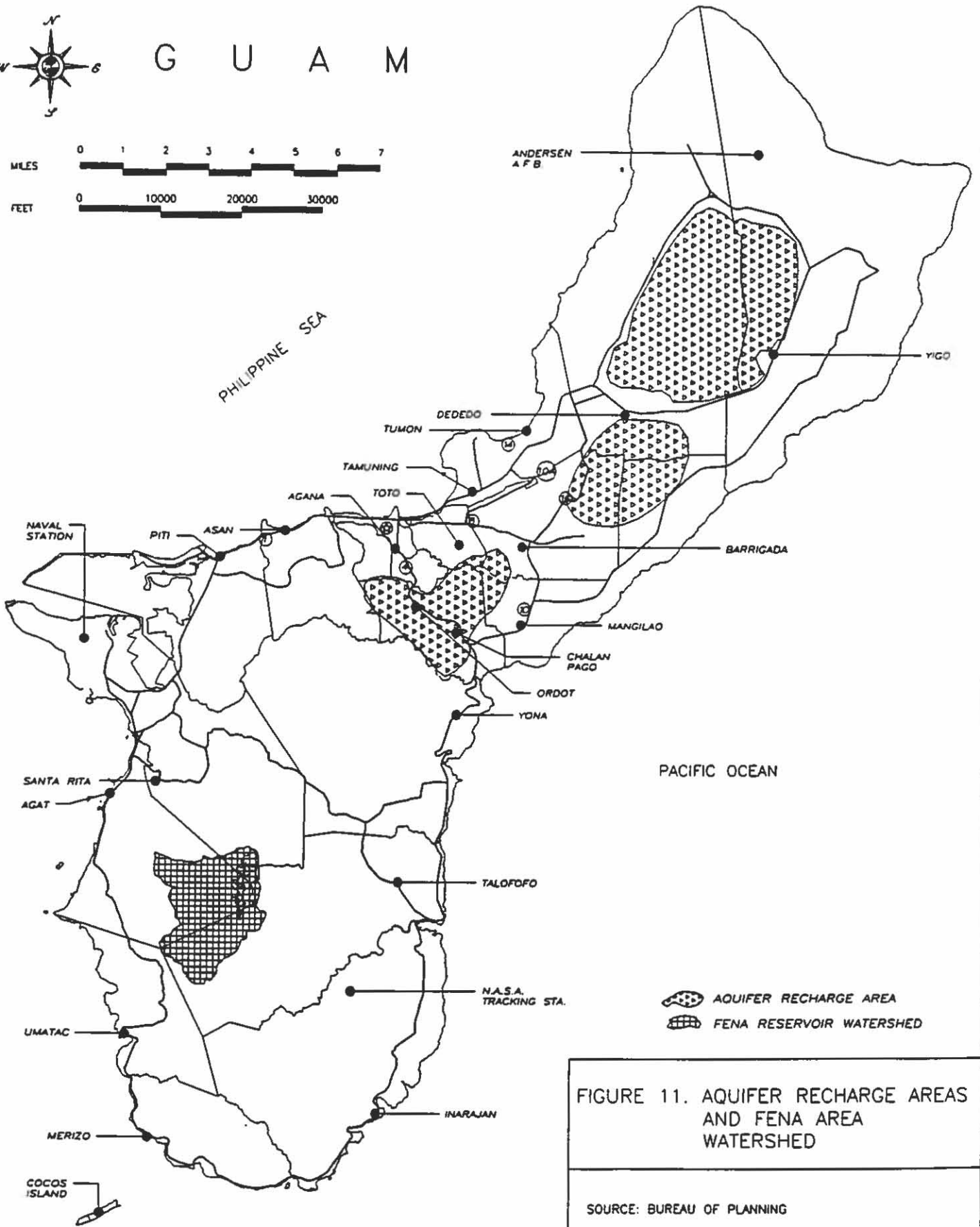
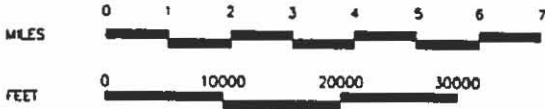


FIGURE 11. AQUIFER RECHARGE AREAS AND FENA AREA WATERSHED

SOURCE: BUREAU OF PLANNING

Potable groundwater supplies are at risk from a variety of contaminants which may be introduced into aquifers by human activities. Common groundwater contaminants include inorganic substances, such as nitrates, salts, and heavy metals; organic chemicals, including fertilizers, pesticides, solvents, and petroleum distillates; microbial contaminants, such as viruses, bacteria, and parasites; and radioactive materials.

Groundwater pollution sources may be classified as either point or non-point sources. Point sources are discrete, known locations. Examples include landfills, wells, leaking underground storage tanks, wastewater disposal facilities, chemical disposal or use sites, and industrial waste outfalls. Non-point sources introduce pollution over a larger area. Examples include the application of agricultural chemicals, areas where agricultural wastes are stockpiled, and areas served by on-site wastewater systems (e.g., septic tanks).

Septic tank systems and leaking public sewer lines present the greatest threat to groundwater from residential land-use activities. Commercial and industrial land uses vary widely in the threats they present to groundwater. Retail businesses that are potentially troublesome include dry cleaning establishments and gasoline stations.

The operating wells and the many abandoned wells provide direct pathways into key aquifers for contamination that originate in surface water runoff from leaking sewer lines, septic tanks, or commercial and industrial sources.

The availability of water will become a more critical issue facing Guam as population and development increase. Maximum utilization of the available groundwater resources can aid in reducing the average cost of water to the consumer and increase the Territory's self-sufficiency with respect to water. Maximum benefits of groundwater can only be derived from proper management and protection of aquifers and wellfields to insure the long-range availability of this resource and to protect the health of the people of Guam.

The Land Use Plan serves to protect the integrity of the Territory's groundwater resources through implementation of wellfield protection regulations in the new Zoning Code and through designation of potential groundwater resource areas. These areas should be protected from adverse development activities that could negatively impact the Territory's aquifers and well-fields.

Reservoir Watershed Areas

The volcanic formations of southern Guam containing water include lava flow, tuffaceous shale and sandstone, conglomerate and breccia, and small amounts of inter-bedded limestone, all of which form a widespread complex of overall low permeability. The rock, in general, is thoroughly weathered to depths as great as 50 feet. Several feet in the top part of the weathered zone is friable granular clay, which has a somewhat higher permeability than the underlying material, and limestone beds form local zones of higher permeability. Because of the wide-spread low permeability, the water table in the volcanic terrain has high relief, standing hundreds of feet above sea level in upland areas and sloping steeply toward streams and lowlands along the shore.

In the southern half of the island, rainfall does not penetrate the volcanic rock as rapidly as limestone and surface water gathers in the form of rivers, streams and wetlands. Surface drainage from watershed areas can be directed into water bodies such as the existing Fena Reservoir. The Fena Reservoir system, located in the Talofoto basin, was constructed in 1951, occupies a 6.5 square mile impoundment area and has a capacity of 2.3 billion gallons. Its dam is 85 feet high and 1,050 feet long. Water from Almagosa and Bona Springs supplement the impounded supply at the Fena water treatment plant. The Fena Reservoir, the largest surface water impoundment on Guam, yields approximately nine million gallons per day. The watershed area for the Fena Reservoir is depicted in Figure 11. The Ugum Reservoir began producing potable water for PUAG in late 1992. In addition PUAG'S Water Master Plan calls for more surface water development and is specifically addressed in PUAG's Surface Water Study.

Reservoir resources could play a vital role in Guam's future water supply since new sources of surface water may be required to supplement groundwater. However, surface water is costly to develop, and there are limited potential sites for surface impoundments. One of the most productive of these (Fena) has been exploited for many years. It is more expensive to build surface impoundments than to drill wells on a per gallon basis. There are also environmental impacts associated with surface water impoundments. These include altered flows and impediments to the migration by aquatic species. It will be necessary to weigh the economic benefits and environmental risks of future development of potable water resources.

Areas of Particular Concern

Areas of Particular Concern (APCs) provide guidelines to ensure that development in areas of environmental significance, or areas that are (or will be in the near future) subject to intense development pressures are managed responsibly.

This section will define and discuss the various types of APCs found on the Island of Guam. These areas are shown in Figure 12 and include Critical Habitat Areas, Conservation Areas, Pristine Ecological Communities, the Seashore Reserve Zone, and Limestone Forests.

Terrestrial Critical Habitats

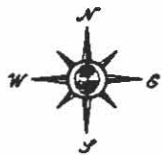
Critical habitats are areas that have the physical and biological features which are essential to the conservation of potential endangered or threatened species. These are areas that may require special management consideration or protection.

At this time, there are no officially designated terrestrial critical habitats. A proposal to designate more than 24,500 acres of forest land on Guam as critical habitat was published by the U.S. Fish and Wildlife Service (USFWS) on June 14, 1991. Of the land proposed as critical habitats, approximately 83 percent is Federally owned and under the jurisdiction of either the U.S. Navy or U.S. Air Force. Under the proposal, any development of critical habitat-designated land would require the approval of the USFWS. Designating these areas as critical habitats may help prevent the possible extinction of endangered species by providing sites for future reintroduction.

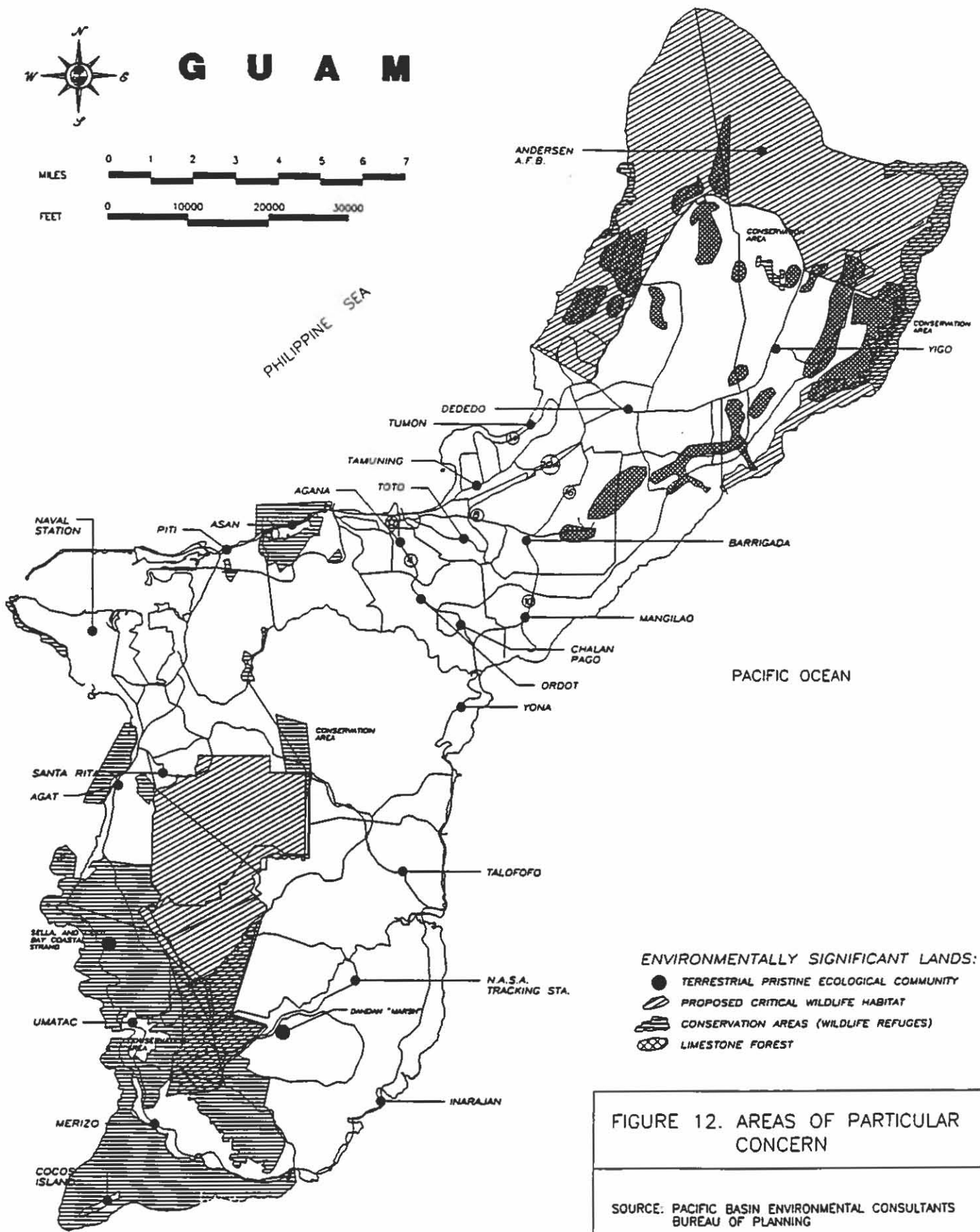
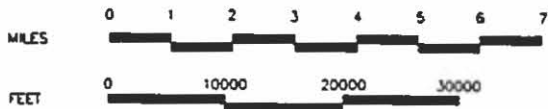
The USFWS proposes to designate this critical habitat for the following four species of birds and two species of bats: The Guam Broadbill (*Myiagra freycineti*), Mariana Crow (*Corvus kubaryi*), Guam Micronesian Kingfisher (*Halcyon cinnamomina*), Guam Bridled White-eye (*Zosterops c. conspicillata*), Marianas Fruit Bat (*Pteropus m. mariannus*) and little Marianas Fruit Bat (*Pteropus tokudae*). All six species were listed as endangered species in 1984.

The primary habitat of these species is undisturbed native forest. The proposed critical habitat includes approximately 16,893 acres in northern Guam and 7,669 acres in the southern portion of the island. The proposed critical habitat area in northern Guam includes coastal areas north of Puntan dos Amantes Park and encompasses the northern tip of the island. Also included is all contiguous coastal Government of Guam property from Anao Point to Campanaya Point, including the Anao Conservation Reserve. In southern Guam, the proposed habitat includes the Naval Magazine, Fena Valley Watershed, and the Bolanos Conservation Reserve. These areas include habitat types favored by the six endangered species and are relatively contiguous tracts of a variety of forest types including mature limestone forest, mixed woodlands, secondary growth strands, coastal stand forest, coconut forests and ravine forests.

A future proposal for critical habitat may include the Talofofu River Valley from the Naval Magazine to the mouth of the Talofofu River. An endangered bird species, the Vanikoro Swiftlet (*Aerodramus vanikorensis bartschi*), is known to nest and roost only in caves on Naval Magazine and forage along the Talofofu River Valley.



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- ENVIRONMENTALLY SIGNIFICANT LANDS:**
- TERRESTRIAL PRISTINE ECOLOGICAL COMMUNITY
 - ◌ PROPOSED CRITICAL WILDLIFE HABITAT
 - ▨ CONSERVATION AREAS (WILDLIFE REFUGES)
 - ◌ LIMESTONE FOREST

FIGURE 12. AREAS OF PARTICULAR CONCERN

SOURCE: PACIFIC BASIN ENVIRONMENTAL CONSULTANTS BUREAU OF PLANNING

Conservation Areas

Conservation districts include unique, environmentally sensitive lands that should be protected from the pressure of development. These lands possess valuable natural resources and geologic constraints or hazards that make the land unsuitable for development. Conservation areas include areas necessary for protecting watersheds and water resources; preserving scenic, wilderness, beach, archaeological, historical, and other cultural and natural resource areas; conserving indigenous plant life and wildlife habitat; preventing floods, soil erosion, and other hazards; and providing park lands. Conservation areas are usually open space areas that provide places for nature observation, scientific study, and enhance the overall aesthetic appearance of the island.

At the present time, no zoning can be established in conservation districts. Instead, development requiring building or grading permits within these areas must be approved by the Territorial Land Use Commission (TLUC).

The Department of Aquatic & Wildlife Resources (DAWR) proposes that conflicting uses in these conservation areas should only be allowed for the duration of the permit or lease. No renewals or new permits for conflicting uses should be authorized once an area is designated as a conservation area.

Terrestrial Pristine Ecological Communities

Terrestrial pristine ecological communities are the most natural and untouched habitats. These include the savannah, limestone forests, ravine forests, coastal strand, and wetlands. Being the least developed lands, these areas are the most aesthetically beautiful examples of natural communities and often contain the highest numbers of endangered and threatened species of plants and animals. Therefore, land and water use within these pristine communities must be managed from a more rigid conservation perspective than other areas of particular concern. A list of pristine terrestrial habitat on Guam is shown on TABLE 7.

Seashore Reserve Zone

The Guam Territorial Seashore Protection Act of 1974 established a "Seashore Reserve" which consists of the land and water area from the seaward ten-fathom contour extending ten meters inland from the Mean High Water (MHW) mark or to the nearest highway (if the highway is closer than ten meters). This Act originally defined the Seashore Reserve as extending 100 meters inland from the MHW mark, but following destruction by Typhoon Pamela in 1976, it was changed to only 10 meters to expedite reconstruction.

TABLE 7 TERRESTRIAL PRISTINE HABITAT	
LOCATION	HABITAT TYPE
Uruno area in northern Guam	Limestone Forest and Coastal Strand
Hilaan Point area approximately 1km north of Tanguisson Power Plant	Coastal Strand, Freshwater Pool and Limestone Forest
A portion of the Tarzan River	Savannah and Ravine Forest
Dandan Marsh Wetland Area central-southeast side of the island	Wetland
Cetti-Sella Bay Region of the southwest coast	Coastal Strand with estuarine bays

Sources: Bureau of Planning,
Pacific Basin Environmental Consultants

All proposals for development within the seashore reserve are subject to review by the Guam Territorial Seashore Protection Commission (TSPC). Cabras Island and residences built along the shoreline before the effective date of the law are exempt.

Limestone Forests

The limestone forests of Guam are so named because they grow in minimal soil on the northern limestone plateau, Orote Peninsula, and areas of the southeast coastline. Limestone forests are a finite resource, as land development has cleared many forested areas. Unlike mainland forests, reforestation is not possible on Guam because the introduced "invader" species of vegetation prohibits the re-establishment of native flora. Limestone forests are characterized by large trees that provide a shaded canopy for understory shrubs, herbs, and lianas. Numerous epiphytic ferns, mosses, and orchids cover the rocks and larger trees. The limestone forest never reaches a climax stage of maximum growth potential because of periodic typhoons.

There are a number of important environmental benefits associated with forested areas. Limestone forests provide habitat for many unique species of plants and animals. Furthermore, they provide an area for collection of medicinal plants and edible animal life such as the popular coconut crab. As an aesthetic resource, these forests are valued for hiking, nature observation and scientific investigation. Also, some of Guam's northern limestone forests lie over areas of the groundwater lens system. Surface runoff is negligible and natural areas inhibit the infiltration of pollutants that are associated with urban development.

As unique, fragile, and valuable wildlife habitats, limestone forests should, in general, be reserved for limited recreational or scientific uses. Medium to high density uses should not be encouraged, and this intensity of development, plus agricultural uses adjacent to these areas, must be sensitively planned to avoid spill-over impacts. Infrastructure development within these and other pristine communities and wildlife refuges should also be minimized.

Natural Preserves/Conservation Reserves

The Department of Parks and Recreation has proposed several additional areas for consideration as special protection owing to unique natural and recreational value. Natural and conservation reserves are those areas necessary for the protection of water resources, historic sites, parklands, forests, savannahs, beaches, native plants and animals, and the prevention of erosion and floods. Natural preserves are intended to remain unimproved while conservation reserves may be improved to provide greater public access to park users while still preserving natural resources. These areas are shown in the following tables.

TABLE 8 PROPOSED NATURAL PRESERVES			
NAME	LOCATION	LEGAL DESCRIPTION	SIZE
Anao	Yigo	Lot 714	681 acres
Camel Rock	Asan	Unsurveyed	2 acres
Pelagi Islets	Agat	Unsurveyed	2 acres
Alutom Island	Agat	Unsurveyed	2 acres
Yona Island	Agat	Unsurveyed	1 acres
Bangi Island	Agat	Unsurveyed	1 acres
Falcona Beach	Dededo	10162	96 acres
Pauliluc	Inarajan	Lot 1	21 acres
Pauliluc	Inarajan	Lot 2	12 acres
Guaifan Point	Inarajan	Lot 3	4 acres
Guijen and Asgor Islands	Inarajan	Unsurveyed	2 acres
Taguan Point	Mangilao	Lot 5403	20 acres
Alupat Island	Tamuning	Unsurveyed	1 acres

Source: Department of Parks and Recreation

TABLE 9 EXISTING NATURAL PRESERVES			
NAME	LOCATION	LEGAL DESCRIPTION	SIZE
Tamuning Cliff	Tamuning	Lot 2098	55 acres
Ypiga	Yigo/Dededo	Lots 7157, 7156, & 7155	16 acres

Source: Department of Parks and Recreation

**TABLE 10
PROPOSED CONSERVATION RESERVE**

NAME	LOCATION	LEGAL DESCRIPTION	SIZE
Northeast Coast	Yigo	Lots 7147*, 7102, 7103, 7163 and 7164	931 acres
Tumon Bay	Tumon	Ypao Point to Bijia Point and the entire seashore reserve	385 acres
Northern Limestone	Yigo/Dededo	Lots 7160, 7154, 7159, 7151, 7153, and unsurveyed lands	550 acres
Asiga	Inarajan	Lot 382	305 acres
Afame	Sinajana	Unsurveyed	17 acres
Masso River Valley	Piti	Lot 286	152 acres
Agana Wetlands	Agana/Sinajana	Lots 86-R1, 85-2, 85-R2	47 acres
Fadian Point	Mangilao	140 and 162	25 acres
Tinechong	Talofofo	Lot 5412 (portion)	303 acres
Sasa Bay	Piti	414	497 acres
Togcha Beach	Yona	Unsurveyed Coastal Strip	954 acres
Piti Bay	Piti	Unsurveyed Submerged	150 acres
Luminao Reef	Piti	Unsurveyed Submerged	551 acres

**TABLE 11
EXISTING CONSERVATION RESERVES**

NAME	LOCATION	LEGAL DESCRIPTION	SIZE
Iates	Mangilao	5397	162 acres
Agana Springs	Agana	Area 72	16 acres
Masso River Reservoir Area	Piti	Unsurveyed	28 acres

Footnote: * Is already in Historic Site

Source: Department of Parks and Recreation

"Conservation Reserves" may be improved for the purpose of making them accessible to the public in a manner consistent with the preservation of their natural features.

TABLE 12 - PROPOSED PARKS		
NAME	LOCATION	SIZE
Wettengel Agana Central	Dededo Agana	Expand to 20 acres Expand by 4 acres to include Lots 87-5 and 88-2

Source: Dept. of Parks and Recreation

In addition to reserve areas, there is also significant opportunity to expand the territorial park system through the transfer of surplus military lands. This transfer of property for public recreation and conservation uses is long overdue, but is believed to be quickly approaching fruition. The DPR has specifically proposed the formation of three new parks with Hilaan identified as part of the excess military lands inventory. These include Hilaan Park, Tarague Park and the Fena Valley Parks.

TABLE 13 PROPOSED PARKS FROM CURRENT MILITARY LANDS			
NAME	LOCATION	LEGAL DESCRIPTION	SIZE
Hilaan Park	Dededo	Andersen, Harmon, Annex, S. Finegayan and NAVCAMS Beach	958 acres
Tarague Park Fena Valley Parks	Yigo Agat, Santa Rita, Talofofo	Anderson Air Force Base Naval Magazine	Est. 1,000 acres 885 acres

Source: Dept. of Parks and Recreation

The proposed Hilaan Park extends from Puntan dos Amantes north to the Federal Aviation Administration housing and offers an outstanding opportunity for such a unique public park.

The area contains a series of white sand beaches and offshore coral reefs with inland coconut groves and the tropical limestone forest rising over 300 feet that offer dramatic scenic vistas. Secluded within this area are remnants of Chamoru culture including the village of Hilaan with numerous latte stone near the unique fresh water pool of Hagoi or Lost Pond.

At the southern end is the developed Tanguisson Beach with its two pavilions and new restroom located in a grove of coconut trees behind the broad sandy beach. In addition to Tanguisson Beach the public increasingly uses the area for a wide variety of activities including swimming, snorkeling, hiking, fishing, picnicking, photography, nature study, camping, and Chamoru cultural activities such as plant gathering for suruhanos.

Therefore, the Hilaan coastline offers an opportunity for all of Guam in a natural setting for a Chamoru resource, the islands proposed first campground for both groups and families, and a unique destination area.

Other opportunities include the proposed Tarague Point Park which is likely to be included in the proposed Guam National Wildlife Refuge now being considered by the U.S. Fish and Wildlife Service to cover much of Andersen Air Force Base.

Another proposed park lies in the Fena Valley around Fena Reservoir Lands in the Naval Magazine.

Prime Agricultural Lands

The movement of low-density, scattered development into agricultural areas has set an unfortunate precedent for future encroachment over a much larger area. Conflicts arose between agricultural use and residential development. Continued urbanization escalated land values, making it more difficult and expensive to maintain viable agricultural operations. Subdivision of property began to occur that altered the traditional land tenure pattern and produced smaller parcels, owing to the landowner's rising expectations of greater land value for suburban development.

The economic viability of agricultural production in the Territory is threatened by a number of constraints. These include:

- Shortages of water during certain times of the year;
- The unavailability of land for use by agricultural producers;
- A tight agricultural labor supply;
- The high purchase cost and lack of dependable maintenance service for farm machinery;
- The high cost and local unavailability of agricultural inputs;
- A limited number of younger practicing farmers

At the same time, however, the need for increasing agricultural production is very evident. The high cost of importing food products and the stability that results from economic diversification tend to make the case for increasing agricultural production.

The topography, superior soils, and Government ownership of large tracts of land in the northern portion of the island offer the greatest opportunities for larger-scale agricultural production. The potential for agricultural production and marketing exists in several areas. Expansion opportunities exist for small scale fruit and vegetable production, ornamental horticulture and foliage plant nurseries, specialty crops, and environmental crop production. Poultry farming and small livestock production are already being practiced.

Considerable potential also exists for commercial production of food crops and fish for domestic use as well as export. A requirement for growth in the agricultural sector, and achieving a high degree of agricultural self-sufficiency in Guam, is strong agricultural policy-making by the Territorial Government. One of the key objectives of I Tano'-ta is the preservation and management of land suitable for long-term agricultural use. The primary strategy to implement this objective has been to protect prime agricultural areas from urbanization.

Therefore, one of the underlying criteria used in the development of the Land Use Plan has been the protection of prime agricultural areas, as identified by the U.S. Soil Conservation Service and the Guam Department of Agriculture and Wildlife Resources. The depiction of these areas are displayed in FIGURE 13. Most of these areas have been designated for intensities of use consistent with agricultural production and related activities, where not otherwise subdivided or presently subject to development pressures.

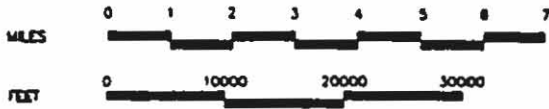
PUBLIC PARTICIPATION PROCESS

Planning can be described as a process for identifying future actions which can achieve desired goals. Just as planning helps individuals carry out their daily activities and pursue their ambitions, communities can also realize a number of practical benefits from this important process. It provides a means of communicating the current needs, desires and interest of citizens to the government, thus enabling officials to better anticipate and provide for the future. Planning can help community residents decide where they want to go and guide their actions toward achieving goals.

Another benefit of planning is improved cooperation and coordination of government actions. Planning can help ensure cooperation between and within various units of government. Thus, planning provides a way of making better informed decisions regarding public and private actions which will help the community realize its desired future growth pattern.

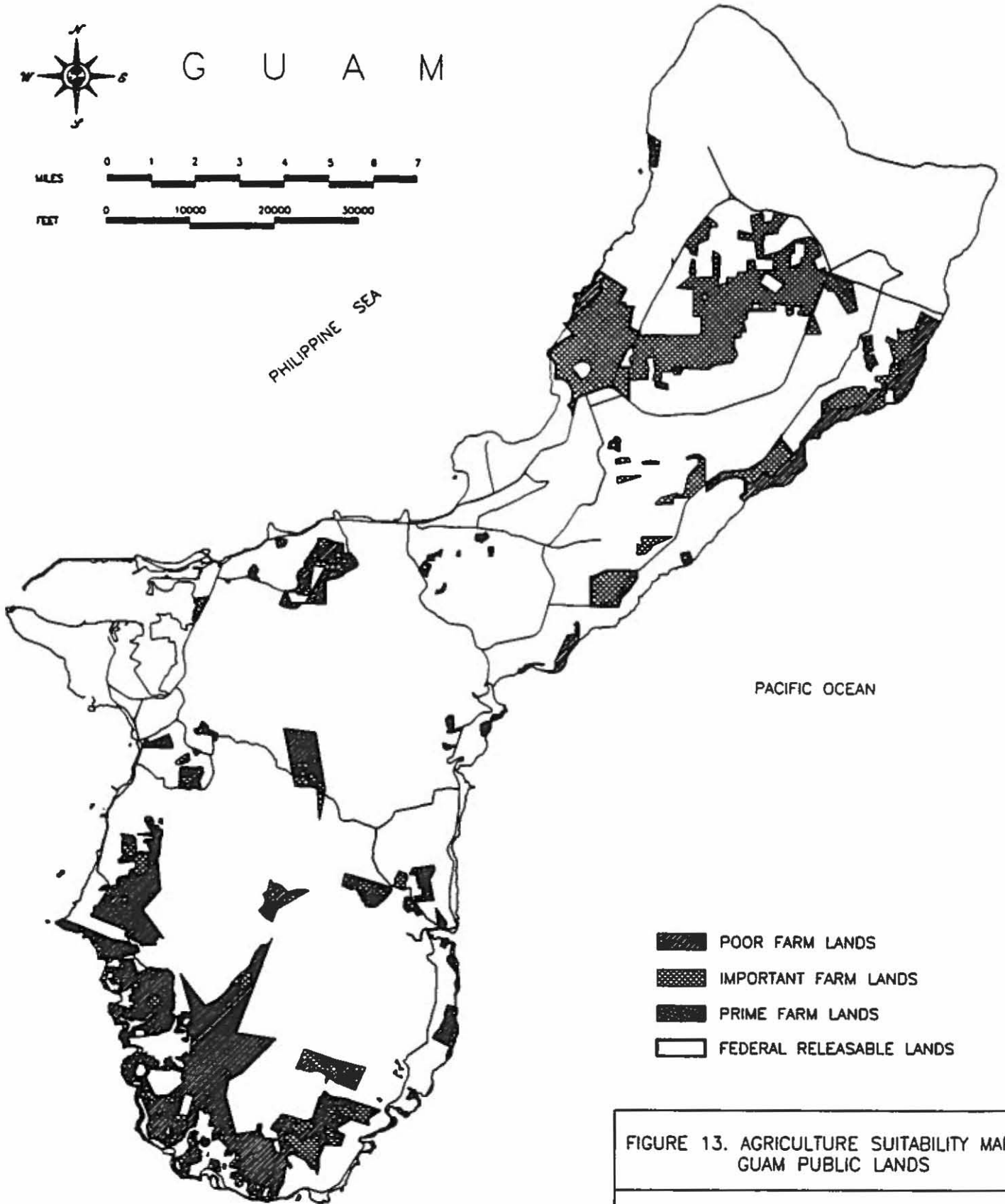


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PHILIPPINE SEA

PACIFIC OCEAN







-  POOR FARM LANDS
-  IMPORTANT FARM LANDS
-  PRIME FARM LANDS
-  FEDERAL RELEASABLE LANDS

FIGURE 13. AGRICULTURE SUITABILITY MAP:
GUAM PUBLIC LANDS

SOURCE: U.S. SOIL CONSERVATION SURVEY

W.B.FLORES/STRATEGIC PLANNING GROUP JV
PREPARED BY: PATTON HARRIS RUST & ASSOCIATES

Traditionally, community interest in the planning process tends to heighten around the issue of land use. It begs the often-repeated question: "What can I do with my land?" and of equal consequence: "Will my children have the opportunity of owning land in the future?" Relative impacts are generally driven by the intensity of land use allowed, and in the case of I Tano'-ta, this will be determined on the Land Use Map. A community participation approach which can specifically define or better focus the role of the citizen will be more successful than one which offers little guidance on the boundaries of input.

By focusing community input into a defined theme, such as future land use, planners and decision-makers alike can help crystallize public perception of issues more effectively. Unlike zoning, where issues are usually well-defined and site-specific, long-range planning issues tend to be "fuzzy"; that is, harder to grasp. It is the planner's role to make them more clear and easily identifiable to lay citizens during the public review process.

The most important benefit of the community participation process is that it provides a means of communication with the public regarding the proposals being set forth in the Land Use Plan.

A second advantage is that a source of legitimacy to the plan is provided. If the plan is presented to the Legislature with a discussion of community involvement and acceptance, then it is more likely to be adopted. The plan is presented as the community's plan and not a "planner's plan" and acceptable to the elected officials. Another benefit of public participation can be an improvement in the quality of public services. The responsiveness of governmental entities can be improved through increased involvement with citizens. As channels of communications are opened, a dialogue is established that will lead to a resolution of problems more quickly.

Finally, community participation and the comprehensive planning process must be addressed at a level the general public can appreciate. The approach in developing I Tano'-ta has focused on the: "Your Beach Shore, Your Drinking Water, or Your Ability to Find Adequate and Affordable Housing, " theme. This places the planner alongside the citizen as they discuss strategies to address growth issues and arrive at a recommended plan.

The public participation component of the planning process has been highlighted by three major series of public outreach initiatives. These consisted of meetings held in each of the nineteen villages around the island during the three phases of the planning process: 1) to identify the major public issues and concerns regarding growth and development; and 2) to present alternative concept plans or visions of Guam's future for public review and comment; and 3) to review the recommended final plan and five-year zoning plan.

Summary of First Series of Village Meetings

The Guam Land Use Plan team, including the Territorial Planning Council and their consultants, conducted the first series of Village Meetings in the Fall of 1991 in each of the nineteen villages. The primary purpose of these meetings was to listen to Village residents' concerns regarding existing development, its effect on their Village and the island as a whole, and their hopes for the future development of the island.

In these first Village Meetings, maps were presented that gave detailed information regarding topography, soil conditions, water quality, historical sites, community facilities, public utilities, land uses, and other issues which affect the quality of life. By analyzing those conditions which have the greatest limitations for development (such as aquifer recharge areas, conservation lands, steeply-sloped areas and wetlands) and those conditions which offer the greatest opportunities for development (such as the availability of public utilities, including water and sewer service), a plan for the future development of the island can be prepared based on which areas are best suited for what specific types of land uses.

The underlying planning rationale for future development must consider those areas which are characterized by unique or fragile environmental conditions. Conservation of these areas serves not only to protect their ecological function, but also their cultural and economic benefit to present and future generations. Other conditions are also present which will, in some form, restrict certain development opportunities for the future. Foremost among these is the presence of large tracts of federal and military lands on the island which are beyond the control of the Government of Guam at the present time.

Significant Issues Discussed Island-wide

Significant issues discussed island-wide are those that were raised at all or most of the village meetings and discussed at length. The major issues raised at these meetings included the following:

- (1) Controlling new development by providing community input into the project approval process to maintain or improve island residents' quality of life and that of future generations;
- (2) Providing adequate public facilities and services, such as schools, parks, roads, medical facilities, power, water, sewer, and solid waste disposal, to meet existing and future demands and requiring developers, as new projects are proposed and built, to pay their fair share of the necessary improvements;
- (3) Providing affordable land and housing for island residents; and
- (4) Preserving Guam's cultural heritage, unique natural resources and traditional way of life.

The Development Planning Process - Having a "say" into the development planning process, the first issue listed above, was perhaps the most significant issue discussed island-wide. Residents in most of the villages proposed forming the equivalent of village level Territorial Land Use Commissions (TLUC's) that would have the ability to approve or deny proposed projects, variances, and rezoning requests.

Public Facilities and Services - The provision of adequate public facilities and services, the second issue listed above, was discussed in all of the villages. Several villages, however, were concerned with particular facilities and services, including:

- **Flood Control** - Inadequate flood control, especially overflowing (or non-existent) storm drainage facilities along roadways, was a very significant issue in the southern villages, including Inarajan, Merizo, Talofoto, and Umatac, and in several of the central villages, particularly Agana, Agat, Barrigada, and Mongmong-Toto-Maite.
- **Potable Water and Power** - Potable water (water quality and its availability) and the provision of power were also significant issues, particularly in the southern villages where there are frequent shortages.
- **Sewage Treatment** - Sewage treatment facilities are lacking in much of the south and are inadequate in some of the more populated northern areas, including Mongmong-Toto-Maite and Tamuning-Tumon, where sewers and pump stations frequently overflow.
- **Solid Waste** - The issue of solid waste disposal was most significant in Chalan Pago-Ordot . The inappropriate location of the landfill (adjacent to residential areas) and its hazards to the village were that community's major problem.
- **Schools** - Overcrowded, inadequate schools are a problem throughout the island, especially in Dededo, Yigo, Yona, Inarajan, and Umatac.
- **Medical Facilities** - The lack of quick, easy accessibility to medical facilities, especially emergency medical service, is a major concern in the southern portion of the island. Residents there proposed locating a major medical facility in that area. Residents of Agat proposed a medical emergency helicopter service for the southern villages. The poor quality of service at the existing hospital in Tamuning was cited by residents of Tamuning-Tumon.
- **Parks and Recreation** - The lack of park and recreation facilities, especially for children and teenagers, was a major issue discussed at each village meeting.

-
- **Circulation** - Improving the road system was important to the residents of Agat who proposed widening Route 2. Other villages, including Umatac, Inarajan, and Merizo, did not want the major road through their villages widened, which would possibly destroy the character of the village, but instead proposed a road that would bypass the village center. A new cross-island "spinal" highway was proposed and discussed at many villages throughout the island. Major issues in the more heavily populated northern and central villages were increasing traffic congestion, high traffic speeds through residential areas, and unsafe pedestrian access (especially for children). Residents in Dededo, Tamuning-Tumon, and Piti, for example, suggested that greater emphasis be placed on mass transit solutions (a monorail, more frequent bus service, increased tourist use of buses and taxis) to reduce traffic. Residents of Chalan Pago-Ordot proposed a toll road to reduce traffic. To slow traffic down, Asan-Maina and Agana Heights residents recommended installing speed bumps on their primarily residential roads. Residents in most of these villages suggested constructing sidewalks and safe bicycle and jogging paths throughout their communities to provide safe pedestrian access, linking residential areas to schools, parks, and recreation centers.
 - **Developers should pay** - An overwhelming majority of residents in all villages felt that developers should be required to pay for the costs of improving public facilities and services that their new project would impact.

Affordable Land and Housing - Most villages were concerned with increasing opportunities for land and housing ownership, the third major issue, particularly among young families and for future generations. Major problems cited included high land costs due to increased tourist-oriented development and the lack of land available for private ownership because of large land holdings by the Federal Government (for example, the National Park lands in Asan-Maina and Santa Rita, community redevelopment land in Asan-Maina, and military lands in Dededo and Piti).

Preservation of Guam's Culture - Several specific recommendations arose out of discussions on this fourth major issue. In Inarajan, residents proposed creating an island cultural center in their Village, not only in the building of shops offering island handicrafts and restaurants, but in terms of development regulations that would maintain the historic village flavor (for example, respecting historic setbacks and lot sizes). In Talofofo, residents stated that development regulations should not preclude them from having small livestock in their front yards, part of their traditional way of life. Residents of Dededo and Yigo were concerned with designating land for agricultural use to maintain their agricultural tradition. Other villages, such as Barrigada and Umatac, recommended preserving Chamoru names of places, villages, and streets, renaming where necessary.

In addition to the above issues, island residents were strongly concerned with the process of developing, approving, and implementing the Land Use Plan. They strongly felt that their input must be heard by the Legislature and that

once the Plan is adopted, the Legislature must follow it and not continue to "spot zone" or re-zone properties for more intensive uses without adequate consideration given to the character of the surrounding development.

Significant Issues Discussed at the Village Level

Significant issues discussed at the village level are those that were raised at several of the village meetings and discussed in detail. They include controlling population, conserving natural resources, and regulating the location and type of tourist development.

Controlling Population Growth - Residents' attitudes toward population growth in all of the villages were concerned with increases in population further straining public facilities and services, such as parks, schools, roads, water, power, sewer, and solid waste disposal, especially as existing infrastructure cannot keep up with current demand, and destroying precious natural resources. Several of the villages, including Agana Heights, Yigo, and Sinajana, would locate new growth only where infrastructure already exists or is currently planned. Most of the villages, including those in the south and the villages of Dededo, Yona, and Mangilao, would take steps that further limit new growth only to those particular projects that have already been granted Government approval or are pending approval.

Conserving Natural Resources - Residents in many of the villages felt that protecting and conserving the island's natural resources was very important. The major issue, cited in Agana Heights, Barrigada, Inarajan, Sinajana, Talofoto, Umatac, and Yona, was possible contamination of the aquifer water supply by golf course development. In addition, polluted beaches, dying reefs, and erosion were significant concerns. Inarajan and Umatac also raised the issue of jet skiing disrupting fishing areas. Residents of Agana Heights, Chalan Pago-Ordot, and Agat proposed educating the public on the potential hazards of new development on the environment before a project is built.

Environmental controls regulating development (especially in a wetland area) were considered by several villages, including Mongmong-Toto-Maite, Merizo, and Sinajana, to be too strict. Residents felt that they should be able to develop their property and, at the very least, should be able to backfill wetlands so as to prevent flooding.

Finally, improved public access to many of the island's natural resources, particularly beaches and falls, was cited by many in Agana Heights, Inarajan, Talofoto, Tamuning-Tumon, and Yona to be an important issue.

Regulating Tourist-Oriented Development - In many of the Villages, residents believed that tourist-oriented development (hotels and golf courses) should not increase, but remain about the same. The primary concern with this type of development was that it has not benefitted the local community, especially in terms of providing improved public facilities and services, and in fact has eroded the quality of those facilities and services by increasing the demand placed on them. The most direct way tourist-oriented development could benefit the community would be to require developers to pay for their fair share of necessary infrastructure improvements. Several Villages, including

Mangilao, Mongmong-Toto-Maite, Santa Rita, and Sinajana, also suggested that these types of developments should be more accessible to locals, perhaps by offering special local rates, improved employment opportunities, etc.

Most of the villages felt that the Tamuning-Tumon area should remain the major, large-scale resort tourist center. The village of Tamuning-Tumon felt, however, that public access to beaches, views to the beach, and access to fishing areas there must be improved. Residents in Inarajan proposed that their village become a cultural center for the island, with shops offering local arts and crafts and restaurants serving local dishes but were against any large-scale tourist development. Residents in Umatac were concerned with maintaining their village character but also recognized the need for additional tourist attractions.

ALTERNATIVE CONCEPT PLANS

The information provided during the first round of village meetings provided the basis for the development of alternative concept plans or "visions" for the island's future spatial development. The alternative visions have been developed for the purpose of helping the public select the best plan, or combination of plans, for Guam. This process will enable the citizenry and the Government to work together for the creation of a final Land Use Plan for guiding development into the 21st century.

Three alternative Land Use Plan Visions for Guam were prepared to present three different development concepts for public review, comment, and consideration. The three alternative Visions were: 1) *The Current Trend Model*, how Guam might develop if current trends of population growth and random infrastructure improvements continue; 2) *The Public Input Model*, developed from the issues and recommendations offered by the public in the first series of Village Meetings; and 3) *The Growth Management Model*, how Guam may develop if growth occurs around the existing and planned infrastructure framework.

The alternative Visions were greatly simplified in an attempt to graphically present the central idea behind each model. None of these plans should be viewed as either "pro-growth" or "no-growth". Rather, all of them assume that the island will continue to grow. Each attempts to accommodate expansion with a different strategy and provides a framework that should accommodate growth well into the 21st century. However, the intent in all of the alternatives was to guide future development into those areas best suited for it, allowing for a certain amount of flexibility that responds to natural, economic, and market forces. Each alternative acknowledges that Guam has only a limited amount of land.

Vision I - Current Trends

"Current trend" simply means a pattern of growth that is similar to the way the island has developed over the past 20-30 years. Under this alternative, future population growth at the village level is projected to the year 2015 based on past growth trends experienced from 1980-1990. The distribution of hotel rooms and condominiums is based on existing, approved, and pending projects as determined by the Guam Bureau of Planning.

Over 55 percent of the Territory-wide projected residential growth would be accounted for by the northern villages, including Dededo, Yigo, and Tamuning if current trends were to continue. In addition, over 50 percent of the tourist developments proposed to be built on Guam would be located in this part of the island. Of these tourism-related developments, almost all would be located in the Tamuning/Tumon Bay area. Additional golf course developments with accompanying hotel/condominium projects are slated for the north, south/east, and central/east portions of the island. The central/ and south/east communities of Mangilao, Chalan Pago and Yona will experience moderate intensity residential growth as the population continues to spill over from the northern portion of the island.

Vision II - Public Input

This Vision is a reflection of the perceived desires of the residents of the villages, based on the information heard from the residents during the first set of village meetings in the form of written surveys, recorded comments, and submitted written testimony. Incorporated in this vision are the issues identified by the public as being of major importance both at the village level and to the island overall.

In this Vision, the actual growth patterns are more obvious in the communities expressing a desire for either increased or decreased residential and commercial development. In terms of resident population growth, the Villages of Mangilao, Santa Rita, Yigo, and Chalan Pago-Ordot were reduced by slightly more than one-third (35 percent) of what their projected growth would be based on past trends (as indicated in Alternative I). This percentage indicates a substantial but not complete reduction in growth. This left more than 18,000 new residents "unaccounted for" and these have been distributed evenly among the villages of Yona, Talofoto, Piti, Agat, and Agana. These villages

expressed either a stronger desire for growth or expressed a relatively neutral position on accommodating additional residential development.

Tourism-related development (hotel rooms/condominiums) was reduced by a factor of 65 percent for the four villages that expressed a reluctance towards rapid tourism development. This development allocation was distributed to three other villages that either desire increased tourism development, were more neutral regarding tourism-related development, or in which hotel/condominium projects are already planned or under way. Tamuning assumed a 50 percent share of the residual hotel room increase and two other villages (Dededo and Chalan-Pago-Ordot) were allocated 25 percent each of the remaining rooms.

Vision III - Growth Management

The distribution of growth in this scenario is based on "growth management" principles critical to the enhancement of quality-of-life issues for a fast-growing island community. These principles include:

- **Creating "employment/housing centers"** - to establish the "critical mass" of land use intensities necessary to reduce the length of automobile trips and maximize the cost efficiency of public services (e.g. water, sewer, and mass transit);
- **Developing mixed-use projects** - (tourism-commercial-residential) to support the intensities necessary to implement a balance between jobs and housing (as well as to create stable community-based villages, reduce the land consumption rate, and provide more opportunities for affordable housing);
- **Allocating new growth** - to protect areas with environmental limitations and to expand non-tourism economic development opportunities (e.g., direct growth away from sensitive areas to reduce the opportunities for encroachment; reduce the threat to groundwater reserves in the north by shifting high water use intensive development, including golf courses, to central and south-central areas of the island where surface water supplies may be exploited more easily, and protect prime agricultural and potential maricultural areas); and
- **Capitalizing on the comparative strengths and weaknesses of both the public and private markets** - This approach assumes public incentives for public/private partnerships (e.g., affordable housing, infrastructure improvements, etc.) are more attractive to the private sector when the private sector has a direct stake in the venture.

The distribution of projected population growth has been concentrated in those areas assumed to be best able to handle additional growth. For example, development is proposed in areas where existing infrastructure or planned improvements are available or planned to be available. The population projections for the villages of Yigo, Chalan Pago/Ordot, and Santa Rita were reduced by 50 percent of their projected growth based on past trends.

Ten villages were assumed to continue growing at a constant "slow" growth rate (1.5 percent) to maintain the flavor and culture of the traditional village. "Infill" development is proposed in these villages, consistent with past trends or growth constraints, such as the lack of significant available land and sewer, water, and transportation. The remaining population that has been unaccounted for is distributed among six villages that appear better suited for increased growth because of an existing infrastructure framework. These include Yona, Dededo, Tamuning, Mangilao, Agana, and Agana Heights. The additional residual population has been added to the projected growth for these villages.

Hotel room/condominium development is concentrated in two major tourism-mixed use "nodes" which appear best suited to meet the stated principles of this model: 1) Tumon Bay-Tamuning; and 2) Barrigada-Mangilao-Yona (this latter node acknowledges the large amount of investment-backed activity already in this area and also recognizes the relative advantages of existing and planned infrastructure - i.e. the Manengon Leo Palace Resort).

A third minor tourism node is proposed for Agat to:

- Reflect the perceived tourism-market demands (investment interest in this area is growing);
- Develop a smaller-scale tourism option to create diversity (visitor choice) between the intensity of a "Waikiki-style" Tumon Bay and perhaps an eco-tourism approach; and
- Reflect the linear constraints of infrastructure (primarily transportation access routes into and out of the Agat area).

Second Series of Village Meetings

The second series of village meetings were held in Spring 1992. The purpose of these meetings was to verify Village input gathered from the first set of meetings and gather public input into the alternative plan visions. The results of this second round led to the development of a Preliminary Land Use Plan which was presented for village resident discussion in six regional meetings in June of 1992.

The second round of meetings on I Tano'-ta were attended by more than 800 residents. The meetings were held to gain public input on and reaction to the three alternative visions prepared for the island's future growth. The intent was to receive comments and perceptions on each of the visions to determine what the public liked and disliked about each plan. Based on that input, a single preliminary Land Use Plan was created incorporating the most favorable aspects from each of the alternative visions.

Public input was received utilizing survey instruments which highlighted summary statements about each vision's relative impact on each region of the island on a number of issues ranging from alternative population growth projections, public service impacts, and future land use activities. The statements describe characteristics associated with the particular impacts of the vision on each of the six regions of the island. Approximately 600 surveys were received and analyzed. The public was queried on their relative likes and dislikes of each statement by region of the island. This process allows the planners to determine both the public's favorable and unfavorable reactions to each vision on a regional and island-wide basis. From that point, a single preliminary plan has been put together.

Vision 1 - "Current Trends" Public Response

This alternative vision is based on a continuation of current trends in population growth, tourism development, urban design, and land use activity around the island. There were 26 descriptive statements summarizing this vision. Eleven of these characteristics (42%) were "liked" by a majority of respondents. However, 15 of them (58 percent) were "disliked". Fourteen were identified as significant, being either "strongly liked" or "strongly disliked", based on achieving a 65 percent or greater share of respondents preference. Nine of the 14 characteristics were strongly liked by respondents, including:

The North

- Expand and improve roads and wastewater treatment facilities.

The Central East

- Increase public/private partnerships in the delivery of new potable water and wastewater needs such as has been planned with the Manengon Leo Palace Resort.

The Southwest

- Allow for more neighborhood stores along Marine Drive;
- Expand the marine industry at the Commercial Port; and
- Preserve the "open space" function of the military and national park lands in Asan and Piti.

The Southeast

- Extend wastewater treatment facilities to Talofofo to meet double the existing demand.

The South

- Promote a slow population growth rate, with most growth concentrated in Santa Rita and Agat;
- Allow some small scale housing developments in the more rural areas; and
- Construct a new wastewater treatment plant and improve the delivery of potable water.

At the same time, five of the 14 characteristics of the "current trends" Vision were viewed as strongly disliked by respondents. These include:

The North

- Developing more golf courses over the northern water lens;
- The doubling of automobile traffic along Routes 10 and 4 as new residents commute to work in Tumon, Tamuning and Dededo; and
- More than 3,000 new hotel rooms would be built in Mangilao and Barrigada.

The Southwest

- Asan, Maina and Piti would continue to lose population.

The Southeast

- New development would occur in some wetland and agricultural areas.

Overall, however, the characteristics and impacts associated with the present level and type of development on the island were found to be unsatisfactory by a majority of respondents. Comparison of island-wide responses to those for the various regions indicate a parallel pattern for all characteristics. The lone exception was in the southwestern region of Asan, Maina, and Piti, where local responses indicated a strong dislike of new hotels, compared with a slightly favorable island-wide reaction to new tourism development in the southwestern Villages.

Vision II - "Public Input" Public Response

The spatial pattern of this alternative vision is based on public comments received during the first round of village meetings concerning existing conditions and trends in population growth, tourism development, urban design, and land use activity around the island. This vision was created by altering the "current trends" vision to reflect the perceived desires of the public regarding growth issues. There were twenty-eight descriptive statements summarizing this vision. Overall, 21 of the 28 characteristics (75%) were "liked" by a majority of respondents, while only seven (25%) were "disliked". Nineteen characteristics are considered significant (i.e., either "strongly liked" or "strongly disliked") based on achieving a 65 percent or greater share of respondents preference. Of the 19 significant characteristics of this vision, 95 percent were strongly liked by respondents, including:

The North

- Concentrate shopping centers around the intersections of Routes 1 and 3;
- No new construction over the water lens;
- Provide alternative transportation routes to Y SengSong Road and Marine Drive; and
- Expand and improve wastewater treatment facilities.

The Central West

- Promote the development of single family homes and small scale apartments in Anigua and Adelup;
- Maintain beach access and views along Agana, Tamuning, and Tumon shorelines; and
- Keep Tamuning and Tumon as the island's major commercial and hotel district.

The Central East

- Maintain slow population increase;
- Provide new alternate roads to the employment centers of Agana and Tamuning; and
- Increase public/private partnerships in the delivery of new potable water and wastewater needs, such as has been planned with the Manengon Leo Palace Resort.

The Southwest

- Promote small population increase by stimulating development of more neighborhood stores and housing;
- Expand the marine industry at the Commercial Port; and
- Control construction along Marine Drive to improve building design and preserve the views and beach access.

The Southeast

- Extend regional wastewater treatment facilities to meet triple the existing demand by utilizing shared use of public/private infrastructure, where available.

The South

- Promote a slow population growth rate, with most growth concentrated in Santa Rita and Agat;
- Allow some small scale housing developments in the more rural areas and preserve the character of the traditional Villages; and
- Construct a new wastewater treatment plant and improve the delivery of potable water.

Only one of the 19 significant characteristics of the "public input" vision was strongly disliked by respondents:

The Southeast

- Some new development would occur in wetland and agricultural areas.

Overall, the characteristics and impacts associated with this vision were found to be highly favorable by a majority of respondents. Comparison of island-wide responses to regional reactions indicate a parallel response pattern for all characteristics of the vision.

Vision III - "Growth Management" Public Response

The spatial pattern of this alternative Vision is based on linking population growth, tourism development, improved urban design, and land use activity with the availability of public infrastructure and services, as well as protecting those resources uniquely vulnerable to the impacts of uncontrolled growth. This vision was, again, created by altering the "current trends" vision to reflect these issues. There were 30

descriptive statements summarizing this vision. Overall, 27 characteristics (90%) were "liked" by a majority of respondents, while only three (10%) were "disliked". Twenty-five are considered significant insofar as being either "strongly liked" or "strongly disliked", based on a 65 percent or greater share of respondents preference. All of the 25 significant characteristics of this vision were strongly liked by respondents, including:

The North

- No new golf courses would develop over the water lens;
- Commercial centers would cluster around major intersections rather than spread out along Marine Drive;
- No hotels should be built;
- New wastewater treatment facilities would be built to meet doubled demand; and
- Mass transit service would be more efficient with new residents living close to shops and jobs.

The Central West

- Redevelopment projects would occur in downtown Agana;
- Mass transit service would be more efficient with new residents living close to jobs and shops; and
- Tamuning and Tumon would remain the island's major commercial and hotel district.

The Central East

- Control the development of strip shopping centers along Route 4 and Route 10;
- Commercial development would create new jobs in Mangilao, reducing commuting needs;
- Provide new alternate roads to the employment centers of Agana and Tamuning; and
- Increase public/private partnerships in the delivery of new potable water and wastewater needs such as has been accomplished with the Manengon Leo Palace Resort.

The Southwest

- Promote small population increase by stimulating development of more neighborhood stores and housing;
- Expand the marine industry at the Commercial Port;

-
- Control construction along Marine Drive to improve building design and preserve the views and beach access; and
 - No hotels would be built.

The Southeast

- A major urban center, including housing, shops, and hotels, would develop in Yona outside of the traditional Village;
- Talofofo would retain its traditional low density character;
- Extend regional wastewater treatment facilities to meet four times the existing demand by utilizing shared use of public/private infrastructure, where available; and
- No development should occur in wetland and agricultural areas.

The South

- Population would increase slowly with most growth concentrated in Santa Rita and Agat;
- New small scale housing developments would occur in Merizo, Umatac, and Inarajan; and
- Demand for new potable water and wastewater service would increase very slowly.

While there were no characteristics described as "strongly disliked", the three "disliked" impacts of this vision related to rapid population growth. Respondents in the Central East and South East regions, by a narrow majority, expressed reluctance towards a doubling or tripling of the population over the next 25 years. At the same time, only a slight majority of the North and Central West respondents indicated a preference for a doubling of the population and the construction of high density residential/commercial mixed-use development.

Nevertheless, the "Growth Management" alternative future received the most satisfactory responses from the majority of residents who attended the second round of I Tano'-ta meetings. More of the characteristics and impacts associated with this vision were "liked" than any other alternative vision presented. Approximately 90 percent of the characteristics associated with this concept plan were "liked" by the public who responded. Only 10 percent of the descriptive characteristics were found to be unfavorable.

Summary

The public response to the alternative Visions clearly defined the attitude of those sampled toward many growth issues. The scenario of allowing the current pattern of development and its impacts to continue as it has (the "current trends" vision), was clearly found to be unacceptable by a majority of the public who attended the I Tano'-ta meetings. This may also be termed the "do nothing" approach (i.e., government would do nothing to change the status quo). The "public input" alternative, which incorporated many of the public concerns and desires about the future of Guam received strong support in many areas and on many issues. Yet, there still remained several issues and regions of the island where there was no clear public sentiment regarding growth and the impacts of future development.

Therefore, the third alternative (the "growth management" vision) was put forward to reflect a planned future taking into account both economic growth and preservation of the traditional culture and resources of the island. This concept plan received the strongest acceptance of all three alternative visions and helped to crystallize many of the public's views and about how it may lead to a better quality of life in the future.

A preliminary Land Use Plan was created based on these inputs. This is not simply a refinement of the most popular vision, but includes the most-liked aspects of each of the alternatives. Several characteristic statements of each region received consensus from both the regional and island-wide respondents:

- The Southern Villages (Agat, Santa Rita, Merizo, Umatac, and Inarajan) should be allowed to preserve their traditional culture, while maintaining a stable population and economic base. Population growth will be held back by environmental and infrastructural limitations. There will be very limited hotel and tourist facilities in the South. Most growth will occur in Agat and Santa Rita with smaller-scale commercial activities promoted in this area.
- The Southwestern Villages (Asan-Maina and Piti) need economic input from the continued development of the Commercial Port. At the same time, more housing and small business stimulus is needed to provide families with better opportunities to stay in the villages, while still preserving their traditional ties to the oceanfront.
- The Southeastern Villages (Yona and Talofoyo) will experience more rapid growth as golf courses and tourist-oriented facilities are built. Significant infrastructure improvements will be made to the region's roads, potable water, and wastewater treatment systems. The Manengon Leo Palace project will be the stimulus for the development of a new urban center in Yona. However, most growth will occur away from the traditional village core, and both Yona and Talofoyo will retain their low density and small-scale commercial centers.

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- The Central East Villages (Agana Heights, Sinajana, Barrigada, M-T-M, Mangilao, and Chalan-Pago Ordot) will also be the focus of significant growth pressure. The availability of roads, land, and other public infrastructure will draw development from the more urbanized areas of the island. Large-scale residential and commercial development will be attracted to the region, prompting the need for the control of roadside development.
 - The Central West Villages (Agana, Tamuning, and Tumon) will continue to be the major hotel and commercial district on the island. Redevelopment efforts will be focused on creating more housing and other activities in downtown Agana, reflecting the increased interest in Agana's heritage. Tumon will remain the primary hotel and tourist district. Tamuning will remain as the primary commercial district.
 - The Northern Villages (Dededo and Yigo) will continue to be the primary focus of new growth. However, the rate of growth should be timed to coincide with the efficient delivery of potable water, wastewater, and new highways, so as to maintain an adequate quality of life in the region. The future growth rate should be slowed so as to let the delivery of potable water, wastewater services, and new highways catchup and provide an adequate level of service to residents, as well as recognizing that protection of the groundwater lens has paramount importance. The development of golf courses, hotels, and other tourist facilities should be discouraged in the north.

IMPACTS OF GROWTH

Land Allocation

The first step that must be taken is to determine how much land would be required to accommodate the expected population by the year 2015. Of particular importance in gauging the impact of new development and the demand for future resources is determining the amount of residential, commercial, industrial, and tourist development areas where future residents will live, shop, work, and play.

Initially, a determination must be made of how much land is currently being used in the various land use categories. This exercise is based on an existing generalized land use survey prepared in 1991. According to the survey, the single largest use of non-federal developed land in Guam is for residential development. The predominant type of development in this category is low-density single-family housing which occupies approximately 7,595 acres of land. Medium- and high-density multi-family housing comprise another 425 acres. This indicates a strong preference for lower density residential development among Guam residents.

Commercial uses account for approximately 697 acres. Primary commercial activity occurs in the urbanized Agana-Tamuning-Barrigada area. Industrial activities cover about 613 acres of land. Industrial and warehousing land uses are concentrated mostly in the Harmon area. Tourist developments (including hotels and ancillary uses) comprise 1,272 acres. Today, most of these uses are found in the Tumon Bay area.

The relationship between the amount of land in each land use category and the current population helps to define the existing land use demand on the island. This relationship is based on an estimated 1990 population of 133,152 and is shown in the following table.

TABLE 14 1991 Land Use/Population Relationships	
DENSITY	PERSONS PER ACRE
Residential (Low Density)	18
Residential (Med-High Density)	313
Commercial	191
Industrial/Warehousing	217

Source: WBF/SPG; Richard Rosario, 1991.

The demand for residential land will continue to be the major need in Guam and, therefore, is the primary focus of determining how much land will be needed in each Village under the preliminary plan scenario. Supporting land uses, such as commercial activities, are assumed to want to locate near major residential growth areas. Industrial uses are likely to remain concentrated in existing locales such as Harmon and are less a function of population growth than of economic diversification.

Although precise figures are not yet available for 1990, the 1980 U.S. Census reported that island-wide approximately 74 percent of the total year-round housing units were single-family units and the remaining 26 percent were multi-family. This ratio is reflective of the historic preference for low density housing in the Territory. Determination of future demand for housing units is based on projected population growth by village for each of the alternative concept plans and the existing relationship to the average household size in the Territory.

Calculations of gross land acreage needed for residential development under each of the Visions are estimated based on a gross residential density standard of 2.5 dwelling units per acre for single-family development and 12 units per acre for multi-family residential development. Using this method, approximate demand figures can be ascertained for the gross amount of land necessary to accommodate the projected residential growth.

The projection of gross residential acreage is based on the assumption that future development will occur at a slightly higher density than present-day standards to provide more affordable housing opportunities. Therefore, the distribution of future housing types was adjusted to reflect a ratio of 65 percent single-family and 35 percent multi-family residential development. This ratio also reflects recent trends in residential development on the island, which are oriented toward higher density single-family attached, townhome, and condominium development.

Impact Analysis

Relative impacts of growth are determined using a model to measure comparisons to population growth, hotel and condominium unit distribution, infrastructure, and public services at the village level. The model allows for a detailed review of impacts relative to a variety of quality of life and capital improvement/public spending impacts. The impacts are projected on the following tables using level-of-service (LOS) standards.

The LOS standards were developed based on a variety of public and non-public services and "goods" which can be viewed as indicators of the quality of life. By quantifying the need for certain necessary public services based on a per capita unit of demand (experienced at the present time), GovGuam can more efficiently plan for the delivery of those services and facilities in the future based on new population growth. The intent of the LOS methodology and model is to provide a "user friendly" tool to help citizens, planners, and policy-makers measure the relative impacts of alternative approaches to problem-solving in a quick, easy-to-understand format.

The LOS standards are based on existing conditions and population relationships in Guam. Impacts are measured for a wide range of public services, including the demand for potable water and wastewater treatment, solid waste disposal, public safety (fire and police), health care, and recreation.

The total island-wide impacts of the projected growth to the year 2015 are presented in the following discussion. 2015 "impact" projections are based on a permanent population figure of approximately 263,000 and an approximate daily peak visitor population of 32,500. Peak visitor projections are used in the LOS model to account for "worst case" infrastructure planning scenarios and are based on a 95 percent occupancy rate at 1.8 persons per room. These 2015 projections, as previously discussed, are derived based on extrapolation of 2010 projections developed by consultants for the Guam Highway Master Plan. This growth amounts to an approximate doubling of the population over the next 25 years--increasing by about 130,000 persons during the planning period.

The relative impacts of this growth are measured by two different means. By examining the visitor population (i.e., tourists) and the resident population which requires more services from GovGuam providers, the model first projects visitor industry impacts. Hotel rooms would increase slowly from over 5,000 in 1991 to approximately 19,000 by 2015. According to the PUAG Water Facilities Master Plan Update, completed in 1991 by the Barrett Consulting Group, potable water use by hotels on Guam is estimated to generate a demand of 450 gallons per room per day (gprd). The same study indicated a per unit wastewater generation rate of approximately 382 gprd on Guam. Based on these levels of service, the LOS model predicts that a maximum of over six million gallons per day (mgd) of additional potable water supplies and more than five mgd of additional wastewater generation and treatment would be required to serve new hotel development during the next 25 years.

Resident population growth, projected to number approximately 130,000 new residents, is likely to translate into an increased demand for more than 34,000 new housing units over the next 25 years. This projection is based on an existing average household size of 3.8 persons. The total gross acreage of land necessary to accommodate the projected demand for new housing units (the single largest use of private lands on Guam) is approximately 10,000 acres, depending on the relative density of future development.

Major infrastructural impacts, including potable water, wastewater, solid waste, and new automobiles are also predicted by the model using existing levels-of-service.

One of the most often-heard questions generated by any discussion about growth on Guam is "*Where is the water to serve the new population going to come from ?*" or in some cases "*do we even have enough water to serve that many people?*". Guam's primary water needs are supplied by the northern and central water lens or groundwater aquifer. Over-pumping the groundwater supply can lead to saltwater intrusion into the lens and the deterioration of groundwater quality to the point where potable water supplies become unusable or must require extensive and expensive treatment processes. The case in Saipan, for example, is that over-pumping has rendered the groundwater supply so seriously contaminated by saltwater that much of the supply is unfit for public consumption. On Guam, the use of alternative surface water supplies (reservoirs and streams) is currently limited to the southern and south-central portions of the island where topography and soil conditions allow.

Potable Water Needs

Projections of gross potable water demand are generated by the LOS model based on a per capita unit of demand on Guam of 100 gallons per day, according to the Water Facilities Master Plan Update prepared for PUAG in 1991. At that rate of consumption, the projected net resident population growth during the next 25 years would require an additional 13 mgd of potable water supplies by 2015.

Combined with a potential maximum of six mgd for new hotel development, the total island-wide additional water demand by 2015 may reach as high as 19 mgd over existing levels.

Viewed from a regional perspective, projected new resident growth in the northern and central villages (from which potable water is currently supplied by the northern water lens) may account for as much as 11 mgd of the total 13 mgd island-wide demand forecast. An additional four or more mgd of the projected six mgd demand generated by tourism is likely to occur in the service area of PUAG's northern groundwater wells. As much as 15 mgd of the 19 mgd island-wide total new demand may originate from the northern and central villages. Some central wells have been recently removed from production due to increased salinities. New development in the southern and south-central regions are expected to use expanded surface sources for future water supplies.

As previously discussed, the additional "safe" sustained yield of the northern water lens (i.e., over and above existing yield levels) is estimated to be in the 10-12 mgd range. This estimated safe yield limit, however, includes only that supply currently accessible by PUAG. It does not include an estimated 18 mgd current supply which is located under Andersen Air Force Base and which is not accessible by PUAG at the present time. Water quality of the Andersen supplies are unknown at the present time. However, there is some concern over possible contamination of these supplies through past use of the base. Unless an agreement between PUAG and the U.S. Air Force can be reached regarding additional access to these groundwater resources (if they are found to be unpolluted) or alternative water sources/conservation measures are taken, it is probable that continued growth in the northern and central portions of the island may outstrip the available "safe" supply of groundwater by the year 2015.

Wastewater Collection and Treatment Needs

The collection, transmission, and treatment of wastewater generated as a consequence of the overall demand for potable water will also play a significant and costly role in serving future development and maintaining coastal water quality standards. Island-wide, approximately 11 mgd of additional wastewater flow is likely to be generated by the projected resident population. This figure is based on an existing level-of-service demand of 85 gallons per person per day. Projected hotel development may generate an additional four mgd of wastewater effluent to bring total demand to approximately 15 mgd by 2015. While some of this effluent may be treated by existing treatment plants, most of these facilities are operating at or near capacity. The additional demand will require new publicly-funded treatment facilities primarily in the central and northern regions, unless these facilities are required to be installed by private developments. Additional facilities are required for the Agat/Santa Rita area.

Solid Waste Needs

Solid waste disposal needs will reach an estimated rate of more than 250 tons per day by the year 2015 based on an existing generation rate of four lbs per person per day.

Transportation Needs

According to the Department of Public Works, there are currently more than 400,000 vehicle trips per day on Guam. Yet less than one percent of these are accounted for by mass transit. Today (according to U.S. Census figures and the Department of Revenue and Taxation Division of Motor Vehicles) there are an estimated 1.3 persons for every automobile on the island. This may translate into an additional demand for as many as 97,000 new automobiles by 2015 based on new population growth, unless significant mass transit opportunities are pursued or other restrictions applied to the number of automobiles.

Public Safety/Health Care Needs

As both resident and tourist population increases, so too does the need for public services in order to keep pace. If the need for new police officers, firefighters, and hospital beds increases at a rate which maintains the existing level-of-service, there is expected to be an additional demand of more than 300 new police officers, nearly 300 more firefighters, and close to 200 new hospital beds.

Recreation Needs

Finally, based on existing relationships, a projection of need for park and recreational space indicates a demand for over 13,000 acres of additional parks and other recreational areas on the island as new development creates greater pressures for open space and recreational opportunities into the 21st century.

LAND USE PLAN

PREMISE

The existing Zoning Law, which has functioned as the Territory's Land Use Plan for the past 25 years, is out of date in terms of dealing with today's development issues. Additionally, it is unwise to continue to have the Zoning Law attempt to perform "double duty" by being both a policy and a regulatory tool. This Land Use Plan should be viewed as the official document (once it has been adopted by the Legislature) that sets forth the general policies regarding the long-term physical development of the Territory. It must no longer be confused with the Zoning Law which regulates use, intensity, coverage,

bulk, etc. The Land Use Plan lays the foundation for the regulations, it is not meant to embody the regulations themselves.

Performance Planning

The Land Use Plan will guide the future development of the Territory, as noted above. In the United States, this has traditionally taken the form of maps that have areas blocked out and designated for residential, commercial, industrial, agricultural, institutional, and open space uses. Within each of these categories, the following is the normal range of activities that would occur:

Residential: Single-family detached homes, two-family houses, apartments, townhouses, patio homes, condominiums.

Commercial: Retail stores and shops, restaurants, banks, neighborhood convenience stores, supermarkets, shopping centers, gas stations.

Industrial: Manufacturing operations, oil refineries, warehousing, trucking terminals, airport and seaport facilities.

Agricultural: Forests, grazing or pasture land, crops, landscape nurseries, greenhouses.

Institutional: Offices, schools, hospitals, clinics, museums, libraries, police and fire stations, universities.

Open Space: Recreational facilities, parks, and conservation/preservation areas.

The problem with this type of plan is that it has tended to be too restrictive in the different uses of allowed in any of these areas. This is especially a problem in a small island environment. It also forces everyone to get in their car and drive some place to work, shop or play. Short of meeting with the next-door neighbor, the private automobile must be utilized to perform virtually every normal function in a 20th century community.

This type of community planning and regulatory system has fostered the sprawling environment that is prevalent today in Guam. As Charles Abrams, who was one of America's foremost planners, said: "Sprawl is the awkward spreading out of the limbs of either a man or a community. The first is the product of bad manners, the second of bad planning." It is the aim of this Land Use Plan to reverse the trend toward sprawl in Guam that has become manifest over the past 20 years and, thereby, make communities more livable.

Therefore, the process for Guam will depart from this standard land use planning approach. Normally, a plan consist of a rather rigid and inflexible land and water use plan that indicates specific activities that are identified for particular areas as "end-uses" which would be achieved when the community is fully developed. As a practical matter, this "end-use" plan is rarely achieved because conditions change, or the plan may no longer be relevant.

The process proposed to replace the current zoning code provides a mechanism that will respond to the needs of the community, including changing market forces, but still provides the people and government officials with an effective tool for growth management.

This process is termed a land-use intensity system and involves the development of "Intensity Districts." This approach assumes that certain uses have about the same impact on the land, such as residential, and office uses. It assumes that if these activities were to be built one beside the other, they would not adversely impact each other.

Specific criteria have been developed that serve as the foundation of the Plan in its designation of land uses. These criteria are derived from the analysis of existing conditions on the island, a synthesizing of the issues expressed during the citizen participation phase of the planning process, and the implementation of planning strategies to address these issues and concerns.

The Intensity Districts were created to achieve important goals or to maintain areas with distinctive character. There are also districts that are use-oriented; and there are others where the use (e.g. industrial) has special locational needs, unique nuisance factors, or very different relationships with other land uses.

Further, this system is particularly appropriate in areas that are sensitive to development, such as floodplains or steep slopes. For the process to work properly, performance standards must be developed in concert with the Intensity Districts. This must be done, for it is not only the particular use of the land that is important, but how that use takes place with respect to off-street parking, landscaping, buffering, slope treatment, etc., that is critical as well.

INTENSITY DISTRICTS

The proposed Intensity Districts and their associated uses are now described in detail. While a number of uses are listed as being appropriate in each of the Districts, they are not necessarily all-inclusive. They are presented to suggest the "flavor" of the mix of activities that are considered to be appropriate in the respective Districts.

A. INTENSITY DISTRICT 1: Parks

1. General Description of Character and Intent of District

This district includes those areas designated as park lands on parcels owned by the Government of Guam and the National Park Service's War in the Pacific National Historical Park.

2. Permitted Uses

- a. Nature Preserves, Conservation Reserves, Territorial Parks, Community Parks, Territorial Recreation Facilities, Community Recreation Facilities, the War in the Pacific National Historical Park, and Historic Sites.

Land and/or waters that, because of their unique ecological, geological, aesthetic, recreational, prehistoric and historic resources, have been or may be owned and determined by the Government of Guam and/or the Federal Government as areas to be conserved and preserved for future generations.

- National Park Service (War in the Pacific National Historical Park)*
- Natural Preserves, which are to remain unimproved
- Conservation Reserves, which may be improved for the purpose of making them accessible to the public in a manner consistent with the perpetuation of their natural features as well as modification through sound forestry and wildlife practices that will enhance and protect the natural resources
- Territorial Parks or Community Parks, which may be improved for the purpose of providing public recreational facilities in a manner consistent with the preservation of their natural features
- Territorial Recreation Facilities or Community Recreation Facilities, which may be improved for the purpose of providing public recreation facilities

- Sites for the preservation of prehistoric, historic and cultural resources, which shall be administered according to GCA Title 21, Chapter 76.
 - Private Concessionaires
- * **The *Intensity District 1: Parks* designation within the authorized boundaries of the War in the Pacific National Historical Park are limited to those lands in public ownership. Lands within the National Park in private ownership shall be designated as *Intensity District 2: Low Intensity* until such time as they are acquired by the National Park Service. When such acquisition has been accomplished, these lands shall then be designated as Intensity District 1.**
- b. In delineating those areas designated as Intensity District 1 on the Land Use Plan Map(s), every effort was made to ensure that all of this land was owned by either the Government of Guam or the federal Government. If, in fact, there are privately-owned parcels that have been inadvertently designated as Intensity District 1, and if the property owner can produce legal instruments to show the Zoning Official that he/she owns lands that have been so designated, these lands shall be automatically re-zoned to Intensity District 2 and the Government shall revise the map(s) accordingly.
- c. District 1 lands shall be administered in conformance with Title 21 GCA Chapter 77 - Parks and Recreation, and any adopted Conservation Master Plan for Guam.
3. *All of the above uses shall be permitted in Intensity District 1, provided that all of the standards for each use, as specified in the following Table of Dimensional and Density Requirements, and those Performance Standards that apply, have been observed. The Performance Standards that could apply include those on the following list. The Zoning Official maintains copies of these Performance Standards and a list of the Government of Guam agencies or departments administering each standard.*
- a. Off-Street Parking and Loading Standards
 - b. Environmental Protection Standards
 - c. Vegetation Protection Standards
 - d. Sign Standards
 - e. Historic and Cultural Conservation Standards
 - f. Stormwater Management Standards
 - g. Floodplain Protection Standards
 - h. Wellfield/Groundwater Protection Standards
 - i. Hillside Development Standards
 - j. Supplemental Regulations

B. INTENSITY DISTRICT 2: Low Intensity

1. General Description of Character and Intent of District

This District includes undeveloped and sparsely-developed areas and outlying subdivisions that are located outside the service districts for existing sewer and/or water lines. District 2 accommodates low-density residential neighborhoods with active and passive recreational facilities and neighborhood-oriented commercial activities. This District also encourages agriculture and aquaculture activities and provides for a range of public services. Performance Standards to ensure that the natural functions of environmentally sensitive areas such as very steep slopes, wetlands, beaches, flood plains, limestone forests, and potable water wellfield areas are maintained will be enforced. The ranges and types of activities that are proposed for inclusion in the District are listed below:

2. Permitted Uses

a. Agriculture and Aquaculture

Establishments primarily engaged in the production of crops, plants, vines and trees, and aquaculture operations.

- Agricultural Uses
- Food Crop Production
- Horticultural Activities
- Livestock Production*
- Botanical Gardens
- Aquaculture/Hatcheries

*Note: Within the area contained between Routes 1 and 3 over the Northern Aquifer, no major livestock operations shall be permitted unless the operation is approved by the Guam Environmental Protection Agency in accordance with their regulations for agriculture and livestock practices for this area. "Livestock" within this context shall include poultry, swine, horses, and cattle. More than twenty-five (25) chickens or other poultry species, or more than five (5) head of swine, horses or cattle shall constitute "Major Livestock Operations".

b. Dwellings

Buildings occupied or intended to be occupied for residential purposes and supporting activities.

- **Single-Family Dwellings**
- **Duplexes or Two-Family Dwellings**
- **Home Occupations**
- **Accessory Buildings/Structures**
- **Planned Unit Development**
- **Planned Affordable Residential Development**

c. Bed & Breakfast Inns/Guest Houses

Any building used, or intended to be used, rented, or hired out to be occupied for sleeping purposes by guests.

- **Bed & Breakfast Inns**
- **Guest Houses**

d. Limited Government Services, Public Utilities, and Quasi-Public Facilities

Government agencies and entities (and their satellite offices) that provide administrative services to the community. Auxiliary facilities that provide electricity, sanitary services, water, transportation services, communications, and other related services for public consumption. Quasi-Public Facilities such as Houses of Worship.

- **Sewage Lift Stations/Water Wells and Pump Stations**
- **Electrical Substations**
- **Public Safety (Police/Fire) Substations**
- **Houses of Worship**
- **Electrical Transmission Lines**
- **Libraries**

e. **Recreational Facilities and Open Space Uses**

Active or passive recreational areas.

- Ball Parks
- Golf Courses
- Neighborhood Parks
- Playgrounds
- Community Parks
- Cemeteries
- Marinas
- Botanical Gardens
- Zoological Parks
- Conservation Areas
- Golf Driving Ranges
- Baseball Batting Cage Facilities
- Private Concessionaires
- Essential Management Facilities
- Horseback Riding Facilities
- Race Tracks
- Natural Preserves

f. **Retail Trade**

Establishments primarily engaged in providing finished products to individuals on a limited scale.

- Convenience Stores
- Books and Stationery
- Confectionery
- Dairy Products
- Groceries
- Pharmacies
- Plant Nurseries
- Agricultural and aquacultural products at roadside or concession stands at their respective production sites.
- Neighborhood Shopping Centers

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- **Retail Food Establishments: Restaurants and Catering Services Only**

g. Personal Services

Establishments engaged in providing services generally to individuals.

- **Barber Shops**
- **Beauty Salons**
- **Health Care Facilities**
- **Private Clubs**
- **Day Care Centers**

3. *All of the above uses shall be permitted in Intensity District 2, provided that all of the standards for each use, as specified in the following Table of Dimensional and Density Requirements, and those Performance Standards that apply have been observed. The Performance Standards that could apply include those on the following list. The Zoning Official maintains copies of these Performance Standards and a list of the Government of Guam agencies or departments administering each standard.*

- a. Residential Performance Standards**
- b. Nonresidential Performance Standards**
- c. Off-Street Parking and Loading Standards**
- d. Recreational and Open Space Standards**
- e. Environmental Protection Standards**
- f. Vegetation Protection Standards**
- g. Sign Standards**
- h. Historic and Cultural Conservation Standards**
- i. Agricultural Land Preservation Standards**
- j. Stormwater Management Standards**
- k. Floodplain Protection Standards**
- l. Wellfield/Groundwater Protection Standards**
- m. Hillside Development Standards**
- n. Landscape Standards**
- o. Supplemental Regulations**

C. INTENSITY DISTRICT 2M: Marine District

1. General Description of Character and Intent of District

This District has been created to protect and manage this special marine area. It encompasses the coastline extending from Fadian to Tagachang Point. This coastline includes Pago Bay, which is one of the few primarily undeveloped bays. It has some of the richest coral fauna of any site on Guam, with nearly 300 species of corals identified from the reef. The coastline, and Pago Bay in particular, is one of Guam's most accessible and heavily used coastal fishing sites, supporting net, rod and reel, and spear fishing. It is also the home of the University of Guam Marine Laboratory. The viability of the efforts at the Marine Laboratory and its research programs depend on having clean seawater and protection of the Pago Bay reef. Immediately north at Fadian Point is the Guam Aquacultural Development and Training Center which also depends on a pristine and protected coastline. The area south of the University of Guam at Tagachang Point has been identified as the preferred site for the Territorial Aquarium.

The purpose of establishing Intensity District 2M incorporates an anticipatory and proactive approach to planning and management of Guam's ocean and coastal resources. Ocean resources are a public trust and Government, in cooperation with business leaders and the general public, must act as knowledgeable stewards that nurture resources and provide for their long term sustainability. In establishing this Intensity District 2M, it proposes an ocean stewardship concept in which sustainable development and conservation are integral components, so that resources and economic benefits can be passed on to future generations. It advocates the need for sustainable development, which recognizes that economic development will occur, and establishes physical, ecological and socioeconomic limitations to guide this development.

This District encourages economic diversity in the area of marine biotechnology, and aquacultural activities. Guam has the potential of

developing its marine resources. Performance Standards will be enforced to ensure that the natural functions of environmentally sensitive areas such as very steep slopes, wetlands, beaches, flood plains, limestone forests, and potable water wellfield areas are maintained well. The ranges and types of activities that are proposed for inclusion in the District are listed below:

2. Permitted Uses

a. Agriculture, Aquaculture and Marine Biotechnology

Establishments primarily engaged in the production of crop, plants, vines and trees, and aquaculture operations.

- Aquaculture/Hatcheries
- Horticultural Activities
- Botanical Gardens

b. Dwellings

Buildings occupied or intended to be occupied for residential purposes and supporting activities.

- Single-Family Dwellings
- Duplexes or Two-Family Dwellings
- Home Occupations
- Accessory Buildings/Structures
- Planned Unit Development
- Planned Affordable Residential Development

c. Limited Government Services, Public Utilities, and Quasi-Public Facilities

Government agencies and entities (and their satellite offices) that provide administrative services to the community. Auxiliary facilities that provide electricity, sanitary services, water, transportation services, communications, and other related services for public consumption. Quasi-Public Facilities such as Houses of Worship.

- Sewage Lift Stations/Water Pump Stations
- Electrical Substations
- Houses of Worship
- Electrical Transmission Lines
- Libraries

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- Technical Training Centers
- d. Recreational Facilities and Open Space Uses
Active or passive recreational areas.
- Neighborhood Parks
 - Playgrounds
 - Community Parks and Beach Parks
 - Zoological Parks
 - Aquarium
 - Conservation Areas and Marine Sanctuaries
 - Underwater Trails
 - Cultural Centers
 - Museums
- e. Retail Trade
Establishments primarily engaged in providing finished products to individuals on a limited scale.
- Convenience Stores
 - Agricultural and aquacultural products at roadside or concession stands at their respective production sites.
 - Retail Food Establishments: Restaurants and Catering Services Only
- f. Biotechnology Centers
Establishments engaged in research and development in:
- Marine Natural Products
 - Marine Research and Development centers
3. *All of the above uses shall be permitted in Intensity District 2M, provided that all of the standards for each use, as specified in the following Table of Dimensional and Density Requirements, and those Performance Standards that apply have been observed. The Performance Standards that could apply include those on the following list. The Zoning Official maintains copies of these Performance*

Standards and a list of the Government of Guam agencies or departments administering each standard.

- a. Residential Performance Standards
- b. Nonresidential Performance Standards
- c. Off-Street Parking and Loading Standards
- d. Recreational and Open Space Standards
- e. Environmental Protection Standards
- f. Vegetation Protection Standards
- g. Sign Standards
- h. Historic and Cultural Conservation Standards
- i. Agricultural Land Preservation Standards
- j. Stormwater Management Standards
- k. Floodplain Protection Standards
- l. Wellfield/Groundwater Protection Standards
- m. Hillside Development Standards
- n. Landscape Standards
- o. Supplemental Regulations

D. INTENSITY DISTRICT 3: Moderate Intensity

1. General Description of Character and Intent of District

This District primarily includes areas that are serviced by current or planned public sewer and potable water lines. Larger residential subdivisions and limited commercial development are permitted in these areas. This District accommodates medium-density residential development, limited offices, active and passive recreational facilities, smaller-scale hotels, as well as community- and neighborhood-oriented commercial facilities. This District is served by both public sewer and potable water facilities or have planned expansions thereto programmed within five (5) years from the date of adoption of the Zoning Code.

2. Permitted Uses

a. Agriculture and Aquaculture

Establishments primarily engaged in the production of crops, plants, vines and trees and aquaculture operations.

- Agricultural Uses
- Food Crop Production
- Horticultural Activities
- Botanical Gardens
- Aquaculture

b. Dwellings

Buildings occupied or intended to be occupied for residential purposes and supporting activities.

- Single-Family Detached Dwellings (also Affordable-see definitions)
- Single-Family and Two-Family/Duplex Dwellings
- Attached Dwelling (Townhouses)
- Zero Lot Line Homes
- Multiple-Family Dwellings
- Home Occupations

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- Accessory Buildings/Structures
 - Residential Treatment Facility
 - Planned Unit Development
 - Planned Affordable Residential Development

c. Hotels & Guest Houses

Any building used, or intended to be used, rented or hired out to be occupied for sleeping purposes by guests. Large resorts are not to be allowed in this District.

- Bed & Breakfast Inns
- Guest Houses
- Boarding/Rooming Houses
- Hotels/Motels

d. Schools

Institutions of learning and their associated uses such as dormitories.

- Primary
- Middle
- Secondary
- Pre-school facilities
- Colleges/Universities
- Other School Facilities

e. Retail Trade

Establishments primarily engaged in providing finished products to individuals. However, no car dealerships, gasoline stations, auto repair facilities, or car washes are to be allowed in this District.

- Apparel & Accessories
- Books & Stationery
- Confectionery
- Dairy Products
- Electrical & Electronic Products
- Groceries
- Retail Food Est.: Restaurants and Catering Services Only

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- Household Items
 - Home Building Supply
 - Camera Shops/Photographic Equipment
 - Neighborhood and Community Shopping Centers
 - Smaller Supermarkets
 - Pharmacies
 - Plant Nurseries
 - Convenience Stores
 - Theaters
 - Flea Markets
 - Museums/Art Galleries
 - Agricultural or Produce Concession Stands

f. Personal Services

Establishments primarily engaged in providing services to individuals.

- Small Boat Repair Facilities and Services (within one mile of Intensity District 5 boundary at Merizo only)
- Barber Shops
- Beauty Salons
- Health Clubs
- Private Clubs
- Funeral Services
- Shoe Repair Shops
- Opticians
- Laundromats/Laundry Services
- Day Care Centers
- Veterinarians/Animal Kennels
- Banks

g. Business or Professional Services

Establishments primarily engaged in rendering services to business establishments and private individuals on a contract or fee basis.

- Advertising Agencies
- Legal Services
- Accounting Services

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- Finance, Insurance and Real Estate Services
 - Employment Services
 - Health Care Facilities
 - Tour Wholesale Companies/Travel Agencies
 - Professional Consultants

h. Limited Government Services, Public Utilities, and Quasi-Public Facilities

Government agencies and entities (and their satellite offices) that provide administrative and health care services to the community. Auxiliary facilities that provide electricity, sanitary services, water, transportation services, communications, and other related services for public consumption. Quasi-Public Facilities such as Houses of Worship.

- Post Offices or Postal Substations
- Public Safety (Police/Fire) Substations
- Community Centers
- Sewage Lift Stations/Water Wells and Pump Stations
- Electrical Substations
- Houses of Worship
- Hospitals/Sanitarium
- Libraries
- Correctional Facilities
- Electrical Transmission Lines

i. Recreational Facilities

Active or passive recreational areas or establishments engaged in providing amusement or entertainment services.

- Ball Parks
- Urban Parks/Playgrounds
- Amusement Parks
- Swimming Pools
- Horseback Riding
- Marinas/Yacht Club
- Private Concessionaires
- Essential Management Facilities

3. All of the above uses shall be permitted in Intensity District 3, provided that all of the standards for each use, as specified in the following Table of Dimensional and Density Requirements, and those Performance Standards that apply, have been observed. The Performance Standards that could apply include those on the following list. The Zoning Official maintains copies of these Performance Standards and a list of the Government of Guam agencies or departments administering each standard.

- a. Residential Performance Standards
- b. Nonresidential Performance Standards
- c. Off-Street Parking and Loading Standards
- d. Recreation and Open Space Standards
- e. Environmental Protection Standards
- f. Vegetation Protection Standards
- g. Sign Standards
- h. Historic and Cultural Conservation Standards
- i. Stormwater Management Standards
- j. Floodplain Protection Standards
- k. Wellfield/Groundwater Protection Standards
- l. Hillside Development Standards
- m. Landscape Standards
- n. Supplemental Regulations

F. INTENSITY DISTRICT 4: High Intensity

1. General Description of Character and Intent of District

This District includes moderately- to densely-developed areas that are located primarily on arterial highways and are comprised of higher intensity residential development and a full-range of commercial activities. These areas are serviced by both public sewer and potable water facilities, or have planned expansions thereto programmed within five (5) years from the date of adoption of the Zoning Code.

2. Permitted Uses

a. Dwellings

Buildings occupied or intended to be occupied exclusively for residential purposes and supporting activities.

- Single-Family Detached Dwellings (Affordable-see definitions)
- Single-Family and Two-Family/Duplex Dwellings
- Attached Dwellings (Townhouses)
- Zero Lot Line Homes
- Multiple-Family Dwellings
- Home Occupations
- Accessory Buildings/Structures
- Boarding/Rooming Houses
- Residential Treatment Facility
- Barracks

b. Hotels and Guesthouses

Any building used, or intended to be used, rented or hired out to be occupied for sleeping purposes by guests.

- Apartment Hotels
- Hotels/Motels
- Bed & Breakfast Inns
- Guesthouses

c. **Schools**

Institutions of learning and their associated uses such as dormitories.

- Primary
- Middle
- Secondary
- Pre-school facilities
- College/Universities
- Other School Facilities

d. **Retail Trade Establishments/Wholesale Trade Establishments**

Establishments primarily engaged in providing finished products to individuals and retailers.

- Pawnshops
- Bakeries
- Apparel & Accessories
- Books & Stationery
- Confectionery
- Dairy Products
- Electrical & Electronic Products
- Furniture
- Home Building Supply
- Groceries
- Household Items
- Office Furnishings and Equipment
- Photographic Equipment/Camera Shops
- Sporting Goods
- Automobile Service Stations
- Car Wash
- Shopping Centers
- Automobile Sales and Service
- Automobile Rental
- Supermarkets
- Retail Food Establishments: all types
- Pharmacies
- Bars, Taverns, Cocktail Lounges

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- Adult Entertainment Facilities
 - Adult Book Stores
 - Flea Markets
 - Theaters/Museums/Art Galleries
 - Bus & Mass Transit Storage and Maintenance Facility
 - Agricultural or Produce Stands
 - Video Rentals and Sales
 - Wholesale/Storage/Distribution Facilities
 - Parking Structures

e. Personal Services

Establishments primarily engaged in providing services to individuals.

- Barber Shops
- Beauty Salons
- Health Clubs
- Private Clubs
- Funeral Services
- Shoe Repair Shops
- Opticians
- Automobile Repair & Servicing
- Laundromats/Laundry Services
- Day Care Centers
- Veterinarians/Animal Kennels
- Banks

f. Business or Professional Services

Establishments primarily engaged in rendering services to business establishments and private individuals on a contract or fee basis.

- Advertising Agencies
- Legal Services
- Accounting Services
- Finance, Insurance and Real Estate Services
- Employment Services
- Health Care Facilities
- Tour Wholesale Companies/Travel Agencies

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- Professional Consultants
 - Off-Set Printing/Photocopying/Photo Processing Facilities

g. Limited Government Services, Public Utilities, and Quasi-Public Facilities

Government agencies and entities (and their satellite offices) that provide administrative and health care services to the community. Auxiliary facilities that provide electricity, sanitary services, water, transportation services, communications, and other related services for public consumption. Quasi-Public Facilities such as Houses of Worship.

- Libraries
- Government Offices
- Post Offices or Postal Substations
- Consulates
- Hospital/Sanitariums
- Public Safety (Police/Fire) Substations
- Sewage Lift Stations/Water Wells and Pumping Stations
- Electrical Substations
- Houses of Worship
- Community Centers
- Convention Centers
- Electrical Transmission Lines

h. Recreational and Entertainment Facilities

Active or passive recreational areas or establishments engaged in providing amusement or entertainment services.

- Ball Parks
- Urban Parks
- Playgrounds
- Night Clubs
- Swimming Pools
- Amusement Parks
- Private Concessionaires
- Essential Management Facilities

3. All of these above uses shall be permitted in Intensity District 4, provided that all of the standards for each use, as specified in the following Table of Dimensional and Density Requirements, and those Performance Standards that apply, have been observed. The Performance Standards that could apply include those on the following list. The Zoning Official maintains copies of these Performance Standards and a list of the Government of Guam agencies or departments administering each standard.

- a. Residential Performance Standards
- b. Nonresidential Performance Standards
- c. Off-Street Parking and Loading Standards
- d. Recreational and Open Space Standards
- e. Environmental Protection Standards
- f. Vegetation Protection Standards
- g. Sign Standards
- h. Historic and Cultural Conservation Standards
- i. Stormwater Management Standards
- j. Floodplain Protection Standards
- k. Wellfield/Groundwater Protection Standards
- l. Hillside Development Standards
- m. Landscape Standards
- n. Supplemental Regulations

G. INTENSITY DISTRICT 5: Village/Neighborhood Centers

1. General Description of Character and Intent of District

This District encompasses the existing nucleated villages in the southern sector of Guam, as well as proposed new neighborhood center areas. It is characterized by small-scale retail outlets to meet the daily needs of the people residing in its environs. The intent is to enhance the character of the existing villages and to promote the development of new areas that will be of a scale to encourage social interaction. To that end, Attached Dwellings and small-scale multiple-family dwellings developments are to be encouraged. However, projects of this type will have to be especially sensitive to the environment in which they are proposed to be built, so that the existing character and charm are not destroyed. These areas are serviced by both public sewer and potable water facilities or have planned expansions thereto programmed within five (5) years from the date of the adoption of the Zoning Code.

2. Permitted Uses

a. Dwellings

Buildings occupied or intended to be occupied exclusively for residential purposes and supporting activities.

- Single-Family and Two-Family/Duplex Dwellings
- Attached Dwellings (Townhouses)
- Zero Lot Line Homes
- Multiple Family Dwellings
- Home Occupations
- Accessory Buildings/Structures
- Residential Treatment Facility

b. Hotels and Guesthouses

Any building used or intended to be used, rented, or hired out to be occupied for sleeping purposes by guests.

- Bed & Breakfast Inns

-
- Guesthouses
 - Boarding/Rooming Houses

c. **Schools**

Institutions of learning and their associated uses such as dormitories.

- Pre-school facilities
- Primary
- Middle

d. **Retail Trade**

Establishments primarily engaged in providing finished products to individuals. However, no car dealerships, auto repair facilities, gasoline stations, car washes, or any drive-in establishment (e.g., banks, restaurants, etc.) shall be allowed in this District.

- Apparel and Accessories
- Books and Stationery
- Confectionery
- Dairy Products
- Groceries
- Retail Food Establishments: All types except Drive-In Restaurants
- Gift Shops
- Pharmacies
- Bars, Taverns, Cocktail Lounges
- Bakeries
- Camera Shops/Photographic Equipment
- Theaters
- Video Sales and Rentals

e. **Personal Service Establishments**

Establishments primarily engaged in providing services to individuals.

- Barber Shops/Beauty Shops
- Health Clubs
- Private Clubs
- Health Care Facilities
- Veterinarians/Animal Kennels

- Tailors/Shoe Repair Shops
- Laundromats/Laundry Services
- Funeral Services
- Support Services for Marine and Tourism Activities (Merizo only)
- Day Care Centers
- Banks

f. Limited Government Services and Quasi-Public Facilities

Government agencies and entities (and their satellite offices) that provide administrative services to the community. Auxiliary facilities that provide electricity, sanitary services, water, transportation services, communications, and other related services for public consumption. Quasi-Public Facilities such as Houses of Worship.

- Post Offices or Postal Substations
- Public Safety (Police/Fire) Substations
- Houses of Worship
- Community Centers
- Libraries
- Mayor's and Government Services Offices

g. Recreational Facilities

Active or passive recreational areas.

- Urban Parks
- Playgrounds
- Tot-Lots
- Water Sports Centers
- Oceanfront Parks
- Private Concessionaires
- Essential Management Facilities

3. *All of the above uses shall be permitted in Intensity District 5, provided that all of the standards for each use, as specified in the following Table of Dimensional and Density Requirements, and those Performance Standards that apply, have been observed. The Performance Standards that could apply include those on the following list. The Zoning Official maintains a*

copy of these Performance Standards and a list of the Government of Guam agencies or departments administering each standard.

- a. Residential Performance Standards
- b. Nonresidential Performance Standards
- c. Off-Street Parking and Loading Standards
- d. Recreational and Open Space Standards
- e. Environmental Protection Standards
- f. Vegetation Protection Standards
- g. Sign Standards
- h. Historic and Cultural Conservation Standards
- i. Stormwater Management Standards
- j. Floodplain Protection Standards
- k. Landscape Standards
- l. Supplemental Regulations
- m. Wellfield/Groundwater Protection Standards
- n. Hillside Development Standards

H. INTENSITY DISTRICT 5H: Historic Village Centers

1. General Description of Character and Intent of District

The intent in establishing this District is, in part, the same as for Intensity District 5; that is, to enhance these villages' character and promote their development with new building activity that will be on a scale to encourage social interaction. To that end, Attached Dwellings and small-scale multiple-family dwellings and retail stores are encouraged. However, because of the unique historic architectural heritage of these villages, the most sensitive building design treatment will have to be employed in all new construction within these intensity district boundaries. Historically, the lot sizes in these historic areas are often significantly smaller than the required minimum set forth in the Zoning Code. The owners of these lots will be allowed to rebuild a structure of comparable size and setbacks as can be historically documented for that lot. For these reasons, any development proposed to be constructed within the boundaries of this district must receive the written approval of the Architectural Review Committee for the particular historic district in which the development is located, in addition to the other approvals required by Guam's Zoning Code. (Under authority of GCA Title 14, Chapter 13, Section 13985.62, each historic district, as established by the Guam Historic Preservation Review Board and the TLUC, has its own Architectural Review Committee).

2. Permitted Uses

a. Dwellings

Buildings occupied or intended to be occupied exclusively for residential purposes and supporting activities.

- Single Family and Two Family/Duplex Dwellings
- Attached Dwellings (Townhouses)
- Multiple Family Dwellings
- Home Occupations
- Accessory Buildings/Structures
- Boarding/Rooming Houses
- Residential Treatment Facility

b. Hotels and Guesthouses

Any building used, or intended to be used, rented or hired out to be occupied for sleeping purposes by guests.

- Bed & Breakfast Inns
- Guesthouses

c. Schools

Institutions of learning and their associated uses such as dormitories.

- Pre-School Facilities
- Primary Schools

d. Retail Trade

Establishments primarily engaged in providing finished products to individuals. However, no car dealerships, auto repair facilities, gasoline stations, car washes, or any drive-in establishment (e.g., banks, restaurants, etc.) shall be allowed in this District.

- Apparel & Accessories
- Books & Stationery
- Confectionery
- Dairy Products
- Groceries
- Retail Food Establishments: All types except Drive-In Restaurants
- Gift Shops
- Pharmacies
- Bars, Taverns, Cocktail Lounges
- Bakeries
- Camera Shops

e. Personal Service Establishments

Establishments primarily engaged in providing services to individuals.

- Barber Shops/Beauty Salons
- Private Clubs
- Veterinarians/Animal Kennels
- Tailors/Shoe Repair Shops
- Health Care Facilities

-
- Laundromats/Laundry Services
 - Funeral Services
 - Day Care Centers
 - Banks
 - Support Services for Marine and Tourism Activities

f. Limited Government Services and Quasi-Public Facilities

Government agencies and entities (and their satellite offices) that provide administrative services to the community. Auxiliary facilities that provide electricity, sanitary services, water, transportation services, communications, and other related services for public consumption, as well as the interpretation of historic buildings and the cultural background of the villages. Quasi-Public Facilities such as Houses of Worship.

- Post Offices or Postal Substations
- Public Safety (Police/Fire) Substations
- Houses of Worship
- Community Centers
- Libraries
- Museums & Other Historical Interpretive Facilities

g. Recreational Facilities

Active or passive recreational areas

- Urban Parks
- Playgrounds
- Tot-Lots
- Private Concessionaires
- Essential Management Facilities

3. *All of these uses shall be permitted in Intensity District 5H, provided that all of the standards for each use, as specified in the following Table of Dimensional and Density Requirement, and those Performance Standards that apply, have been observed. The Performance Standards that could apply include those on the following list. The Zoning Official maintains*

copies of these Performance Standards and the Government of Guam agencies or departments administering each standard.

- a. Residential Performance Standards
- b. Nonresidential Performance Standards
- c. Off-Street Parking and Loading Standards
- d. Recreational and Open Space Standards
- e. Environmental Protection Standards
- f. Vegetation Protection Standards
- g. Sign Standards
- h. Historic and Cultural Conservation Standards
- i. Stormwater Management Standards
- j. Floodplain Protection Standards
- k. Landscape Standards
- l. Supplemental Regulations
- m. Wellfield/Groundwater Protection Standards
- n. Hillside Development Standards

I. INTENSITY DISTRICT 6: Urban/District Center

1. General Description of Character and Intent of District

This District includes downtown Agana and is characterized by high-intensity residential, commercial and other central business district functions that provide a full range of pedestrian-oriented commercial activities and urban services. This District does not include highway-oriented commercial activities such as supermarkets and shopping centers, which would be counter-productive in terms of trying to establish a pedestrian-oriented, close-knit urban center.

2. Permitted Uses

a. Dwellings

Buildings occupied or intended to be occupied exclusively for residential purposes and supporting activities.

- Attached Dwellings (Townhouses)
- Multiple-Family Dwellings
- Home Occupations
- Accessory Buildings/Structures
- Boarding/Rooming Houses
- Residential Treatment Facility

b. Hotels and Guesthouses

Any building used, or intended to be used, rented or hired out to be occupied for sleeping purposes by guests.

- Apartment Hotels
- Hotels
- Bed & Breakfast Inns
- Guesthouses

c. Retail Trade

Establishments primarily engaged in providing finished products to individuals. However, no automobile-related retail trade facility, nor

any drive-in establishment (e.g., banks, restaurants, etc.) shall be allowed in this District.

- Apparel & Accessories
- Books & Stationery
- Confectionery
- Dairy Products
- Electrical & Electronic Products
- Furniture
- Groceries
- Household Items
- Office Furnishings and Equipment
- Photographic Equipment/Camera Shops
- Sporting Goods
- Retail Food Establishments: All types except Drive-in Restaurants
- Jewelry
- Pharmacies
- Pawnshops
- Theaters/Art Galleries/Museums
- Boutiques
- Bars, Taverns, Cocktail Lounges
- Bakeries
- Parking Structures

d. Personal Services

Establishments primarily engaged in providing services to individuals.

- Barber Shops/Beauty Salons
- Private Clubs
- Shoe Repair Shops/Tailors
- Opticians
- Laundromats/Laundry Services
- Day Care Centers
- Veterinarians/Animal Kennels
- Banks

e. **Business or Professional Services**

Establishments primarily engaged in rendering services to business establishments or private individuals on a contract or fee basis.

- Advertising Agencies
- Legal Services
- Accounting Services
- Finance, Insurance and Real Estate Services
- Employment Services
- Health Care Facilities
- Tour Wholesale Companies/Travel Agencies
- Professional Consultants
- Off-Set Printing/Photo Copying/Photo Processing Services

f. **Government Services, Limited Public Utilities, and Quasi-Public Facilities**

Government agencies and entities (and their satellite offices) that provide executive, legislative, judicial, regulatory and administrative functions to the community. Auxiliary facilities that provide electricity, sanitary services, water, transportation services, communications, and other related services for public consumption. Quasi-Public Facilities such as Houses of Worship.

- Post Offices or Postal Substations
- Courthouses
- Government Offices
- Public Safety
- Consulates
- Libraries
- Electrical Substations
- Houses of Worship
- Electrical Transmission Lines
- Convention Centers
- Mass Transit Terminals

g. **Recreational Facilities**

Active or passive recreational areas or establishments engaged in providing amusement or entertainment services.

-
- Urban Parks
 - Playgrounds
 - Tot-Lots
 - Night Clubs
 - Health Clubs
 - Swimming Pools
 - Private Concessionaires
 - Essential Management Facilities

3. *All of these uses shall be permitted in Intensity District 6, provided that all of the standards for each use, as specified in the following Table of Dimensional and Density Requirement, and those Performance Standards that apply, have been observed. The Performance Standards that could apply include those on the following list. The Zoning Official maintains copies of these Performance Standards and a list of the Government of Guam agencies or departments administering each standard.*

- a. Residential Performance Standards
- b. Nonresidential Performance Standards
- c. Off-Street Parking and Loading Standards
- d. Recreational and Open Space Standards
- e. Environmental Protection Standards
- f. Vegetation Protection Standards
- g. Sign Standards
- h. Historic and Cultural Conservation Standards
- i. Stormwater Management Standards
- j. Floodplain Protection Standards
- k. Landscape Standards
- l. Supplemental Regulations
- m. Hillside Development Standards

J. INTENSITY DISTRICT 7: Hotel/Resort

1. General Description of Character and Intent of District

This District is intended to encompass the primary tourism areas in the Territory. The major hotels and resorts are proposed to be located in this District, as well as all of the normal supporting retail and recreational services and facilities associated with major tourism areas.

2. Permitted Uses

a. Dwellings

Buildings occupied or intended to be occupied exclusively for residential purposes and supporting activities.

- Attached Dwellings (Townhouses)
- Zero Lot Line Homes
- Multiple Family Dwellings
- Home Occupations
- Accessory Buildings/Structures

b. Hotels and Guesthouses

- Hotels/Apartment Hotels
- Bed and Breakfast Inns
- Guesthouses

c. Retail Trade

Establishments primarily engaged in providing finished products to individuals, with special emphasis on the tourism market. While new or used car dealerships are not to be allowed in this District, gasoline stations and automobile rental agencies are considered to be appropriate uses.

- Retail Food Establishments: all types
- Gift Shops/Jewelry Stores
- Bars/Taverns/Cocktail Lounges
- Amusement Arcades (including shooting galleries)

-
- Duty-Free Shops
 - Apparel and Accessories
 - Shopping Centers
 - Camera Shops/Photographic Equipment
 - Pharmacies
 - Adult Entertainment Facilities
 - Automobile Sales/Service/Rental Facilities
 - Pharmacies
 - Museum/Art Galleries
 - Theaters/Performing Arts Centers
 - Parking Structures

d. Personal Services

Establishments primarily engaged in providing services to individuals.

- Barber Shop/Beauty Salons
- Private Clubs
- Shoe Repair Shops/Tailors
- Laundromats/Laundry Services
- Day Care Centers

e. Business or Professional Services

Establishment primarily engaged in rendering services to business establishments on a contract or fee basis.

- Advertising Agencies
- Health Care Facilities
- Legal Services
- Accounting Services
- Finance, Insurance, and Real Estate Services
- Tour Wholesale Companies/Travel Agencies
- Employment Services

f. Limited Government Services, Public Utilities, and Quasi-Public Facilities

Government agencies and entities (and their satellite offices) that provide administrative services to the community. Auxiliary facilities that provide electricity, sanitary services, water, transportation services, communications, and other related services for public consumption. Quasi-Public Facilities such as Houses of Worship.

- Public Safety Substations
- Sewage Lift Stations/Water Pump Stations
- Water Pump Stations
- Electrical Substations
- Electrical Transmission Lines
- Convention Centers
- Houses of Worship

g. Recreational Facilities

- Urban Parks
- Playgrounds
- Oceanfront Parks
- Night Clubs
- Health Clubs
- Golf Courses
- Tennis Courts
- Water Sports Centers
- Horseback Riding Facilities
- Amusement Parks
- Marinas/Yacht Clubs
- Private Concessionaires
- Essential Management Facilities

3. *All of the above uses shall be permitted in Intensity District 7, provided that all of the standards for each use, as specified in the following Table of Dimensional and Density Requirements, and those Performance Standards that apply, have been observed. The Performance Standards that could apply include those on the following list. The Zoning Official maintains copies of these Performance Standards and a list of the Government of Guam agencies or departments administering each standard.*

-
- a. Residential Performance Standards
 - b. Nonresidential Performance Standards
 - c. Off-Street Parking and Loading Standards
 - d. Recreation and Open Space Standards
 - e. Environmental Protection Standards
 - f. Vegetation Protection Standards
 - g. Sign Standards
 - h. Historic and Cultural Conservation Standards
 - i. Stormwater Management Standards
 - j. Floodplain Protection Standards
 - k. Hillside Development Standards
 - l. Landscape Standards
 - m. Supplemental Regulations

K. INTENSITY DISTRICT 8: Industrial/Port Facilities

1. General Description of Character and Intent of District

This District includes the industrial, warehousing, port-oriented, and major utility areas of the Territory.

2. Permitted Uses

a. Manufacturing/Mining

The processing or assembling of materials or substances into a finished product and the extraction of naturally occurring solids, liquids or gases.

- Bakeries
- Canvas Goods Manufacturing
- Consumer Products/Manufacturing
- Clothing Assembly/Manufacturing
- Cement/Concrete Products Manufacturing, Storing, and Retailing
- Dyeing & Finishing of Textiles
- Bottling Plants (including Distilleries and Breweries)
- Leather Goods Manufacture
- Jewelry & Precious Metals Manufacture
- Pharmaceutical Products Manufacture
- Plastic, Glass, and Tile Products Manufacturing
- Food Processing
- Seafood Process/Packing Facilities
- Marine Industrial Fabricating Facilities
- Watch Assembly
- Quarries and Associated Extractive and Processing Activities
- Petroleum Products Manufacture and Storage
- Freezer Plants/Cold Storage/Food Mills/Fertilizer Production and Storage

b. Wholesale/Storage/Distribution

Establishments engaged in the storage, trucking or transfer of household or commercial goods of any nature; or establishments engaged in the sale of large quantities of goods.

- Wholesale Commercial Operations
- Equipment and Machinery
- Home Building Supply
- Junk Yards
- Warehousing Operations
- Freight Distribution Centers
- Janitorial Supplies
- Health Supplies
- Harbor and Marine Supplies and Service
- Boat Storage Facilities
- Automobile Sales/Service

c. Industrial Services

Establishments engaged in mechanized personal, business and repair services.

- Automobile Repair Shops (Minor, Major, Paint and Body Shops)
- Bus & Mass Transit Storage and Maintenance Facility
- Towing & Wrecking Services
- Laundry Plant
- Electrical & Electronic Equipment
- Construction Services
- Janitorial Services
- Septic Cleaning & Installation
- Marine/Boat Repair Facilities
- Marine Construction and Salvage Operations
- Airport and Associated Uses
- Aviation related activities

d. Public Utilities

Activities which provide electricity, sanitary services, water and other related services for public consumption.

- Electrical Substations/Generating Plants

- Marine Pollution Control Facilities
- Sewage Treatment Plants
- Solid Waste Disposal/Incineration Facilities/Recycling Centers
- Propane/Gasoline/Other Petroleum Products Storage and Distribution Centers
- Sea Port and Associated Uses
- Electrical Transmission Lines

e. Miscellaneous Associated Uses

- Support Services for Marine Activities
- Yacht Clubs/Marinas
- Marine Research Center
- Aquaculture Facilities/Hatcheries
- Any uses approved under the Commercial Port or Airport Master Plans

f. Recreational Facilities

- Water Related Sports Activities

3. *All of the above shall be permitted in Intensity District 8 provided that all of the standards for each use, as specified in the following table of Dimensional and density Requirements, and those Performance Standards that apply, have been observed. The Performance Standards that could apply include those on the following list. The Zoning Official maintains copies of these Performance Standards and a list of the Government of Guam agencies or departments administering each standard.*

- a. Nonresidential Performance Standards
- b. Off-Street Parking and Loading Standards
- c. Environmental Protection Standards
- d. Vegetation Protection Standards
- e. Sign Standards
- f. Historic and Cultural Conservation Standards
- g. Stormwater Management Standards
- h. Floodplain Protection Standards

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- i. Hillside Development Standards
 - j. Landscape Standards
 - k. Supplemental Regulations

PLAN RATIONALE

With the above listing of the Intensity Districts and the representative cataloging of the uses that are proposed to be contained therein for reference, it is time to address the Land Use Plan for Guam. How the various Intensity Districts have been arranged, and an explanation of the rationale behind this arrangement, is presented in the following paragraphs.

One of the basic premises of this Plan is that the federal military lands will be incorporated into the overall process to accommodate possible transfer of lands to the Territorial Government. At the present time 3,150 acres of surplus Department of Defense lands that are located at 19 sites around the island, as well as over 1,800 acres of the Naval Air Station lands, are slated to be returned to the Government of Guam. The return of these lands to the Territorial Government is reflected in the proposed land use allocations. Additionally, the Government of Guam has been discussing with the Federal Government the possible release of over 20,000 more acres of land.

Another basic premise is that the Government of Guam will need to develop a more efficient and coordinated "game plan" to fund and construct a wide range of public works and facilities projects to meet the demands that arise with the doubling of the population. This may include the concept of increased private participation in the planning and funding of these projects to provide public services. Public/Private partnership is a relatively new concept to the island, but serves as an ideal alternative to the heavily reliance on government funding. As we learned, the government is unable to bear all costs for basic government services especially during austere times.

Finally, the development of the Land Use Plan must be based on some economic direction established by local leaders. This direction or policy statements are usually outlined in an economic plan for the Territory defining the types and levels of economic growth the island plans to promote, direct and achieve. This can be tied to some requirement of land through the Land Use Plan.

Although an economic plan does not exist at this point, unwritten policies continue to promote tourism as the island's primary economic component. The Territory is continuing to promote economic diversity, however, that level of change from the norm has not yet been clearly established. Ultimately, this planning process incorporates the existing focus of the island's economy and bases its planning decisions on this focus. This is obvious in the estimation of population growth and the types of uses allowed in the new "Intensity District" system.

An overriding aim of this Land Use Plan is to begin to reorganize the development pattern of the island. This must be achieved for several reasons. First, as has been said many times before in this document, an island has such a finite supply of land. The freedom to make mistakes in this type of environment is simply not there, as exists in larger communities. Second, to enhance the quality of life for the current residents and to ensure that there will be land available for future generations to enjoy, a different approach to growth management is required. Mainland United States planning models and concepts which promote sprawling land development patterns threaten the rich cultural heritage of Guam.

Therefore, the Land Use Plan that is being proposed is one that can accommodate more than 130,000 additional residents, but in doing so, will require less land to meet the needs of the people than is the case today with the existing 132,000 people. This Plan promotes more compact settlements. If this can be achieved, two positive results are likely to occur. First, people will be able to conduct some of their shopping, recreation, travel to school and possibly even to some jobs without having to use a car. Additionally, a doubling of the resident population could conceivably create a "critical mass" of people large enough to justify a meaningful mass transit system. However, for this latter idea to have any hope of fulfillment will require a strict adherence to the concept of compact settlements. The promotion of this type of development pattern will maximize the use of existing infrastructure and require the least amount of expenditure of public monies for expansion or the construction of new roadways, utilities, etc.

SPATIAL DISTRIBUTION OF INTENSITY DISTRICTS

The distribution of future land use activities is shown on Figure 14. There are Intensity District designations given to the military lands including the federal releasable lands. These areas are anticipated to be turned over to the Government of Guam as excess or releasable land. It is assumed that military non-releasable lands will continue to function in more or less their current capacity through the year

2015. Therefore, the entire north side of the island, including Andersen Air Force Base and the Naval Communications Master Station Area are also indicated as military land and, the relative intensity of military uses on these lands have been illustrated on the land use map.

The majority of the area within Routes 1 and 3, incorporating portions of Dededo and Yigo, is proposed as Intensity District 2 (Low Intensity), except for the southwest sector. This latter area has been indicated as Intensity District 3 (Moderate Intensity), recognizing the development that already exists in Dededo as well as a certain amount of infilling that is occurring and should continue, to establish an efficient development pattern. The Intensity District 2 designation for the bulk of this sector has been proposed to restrict urban-level development and, thereby, protect the water lens in this area that constitutes one of the island's main potable water sources as well as provide for continued agricultural opportunities.

In addition to restricting the amount of housing and other associated uses in this area, it is vitally important to either restrict the building of golf courses, or to require that devices be used to hinder the flow of irrigated water back into the aquifer (with such devices as liners). The reason for this is that the soil and rock conditions are extremely porous in this area, so much so that water filtering into the aquifer from a golf course would be carrying large quantities of nutrients and fertilizers that could contaminate the water supply.

A large portion of the releasable federal land is located off Marine Drive in an area known as the Harmon Cliffline. Portions of these lands have been designated Intensity District 2 due to a lack of infrastructure and need for open space. Other portions of these properties have been designated Intensity District 3 to reflect the plan's attempts to promote more affordable housing opportunities. These lands are also located next to developed areas and have the services and mix of uses necessary in a new residential community.

The lands in the Yigo area, especially between Route 1 and 15 are proposed for moderate intensity development (Intensity District 3) with a nucleated neighborhood center (Intensity District 5) in the village core. The neighborhood center could contain small stores and shops to meet the residents' daily needs, and might contain a police substation, fire substation, a church, or elementary school to give the neighborhood a focal point, a central gathering place, a means of identity. This could strengthen the identification of Yigo as a community and, if carefully planned and executed, done in such a way so as not to destroy the integrity of the area that already exists.

This village center is proposed to provide a wider range of shopping opportunities for residents of the area without having to make a long car trip. The development of Yigo in this manner will take advantage of the infrastructure that already exists in the area in terms of roads, water, and sewer facilities.

However, care must be taken to protect and not encroach upon the limestone forests that abut this area immediately to the east of Route 15.

The Artero Urunao Property located on Guam's Northwestern shoreline adjacent to the Navy's Ritidian Complex, has an existing H-Resort Hotel zone and is designated Intensity District 7 (Hotel/Resort). Within the Five-Year Zoning period, there are no plans for infrastructure development in the area. Public access to the area is limited and has yet to be fully resolved. This 420 acre property is incorporated into the Five Year Map to recognize the existing H zone, the need for additional areas to accommodate growth for Guam's tourism industry and the desire to expand the industry into this area.

The Tumon Bay area has been designated as Intensity District 7 (Hotel/Resort). Many of the residents in the first two rounds of village meetings indicated a desire to continue to focus tourism facilities in this area. Given the existing development and proposed expansions, Tumon Bay should remain the focal point for hotels and resorts on Guam. However, it is envisioned that high-rise condominiums would also be an appropriate use of the land in this District. Other activities that are compatible with and supportive of tourism development and that would be allowed in this area include restaurants, gift shops, indoor amusement arcades, and night clubs. These may be either an integral component of a large hotel or resort complex or might be free-standing activities. Other types of uses that have an affinity with the basic aims of this District include car rental agencies, auto service stations (limited to the retail sale of gas and oil) and health clubs.

Just east of Tumon Bay lies the Guam International Airport. Due to the significant amount of airport facility investment and proposed expansion, the airport site has been designated Intensity District 8 (Industrial) to reflect the long term plans of the airport facilities. As the turnover of Naval Air Station to the local government progresses, the lands abutting the airport site have been designated to reflect the existing and planned uses for these tracts. The old Navy housing for example has been designated Intensity District 8, due to its close proximity to existing airport operations. The sports facilities located on the eastern section of NAS has been designated Intensity District 2 to promote continued recreational use of the site and to buffer the airport from non-airport uses.

The Tamuning area and the land straddling both sides north along Marine Drive (Route 1) in this sector are proposed, in the main, to be designated for Intensity District 4 (High Intensity). Off the main roads in Tamuning (Routes 1, 14, 14b, 30 and 30a), a slightly lower intensity is proposed.

These interior parcels are recommended to be in Intensity District 3 (Moderate Intensity), which would reflect the lower density pattern of development that is establishing itself in the area today. The rest of this sector - from immediately east of downtown Agana and east along Route 1 to the Micronesia Mall area and the lands fronting on Routes 14, 14b, 30 and 30a - are proposed for Intensity District 4. This is a reflection of the type of activity that is already occurring in these areas. However, this is not to say that the manner in which the development has been carried out in the past is being condoned.

Everyone - residents, developers, shopkeepers, and government officials - must realize that as Guam becomes increasingly popular as destination resort, what it has to "sell" is its physical beauty, be it natural or man-made. As competition for the tourist dollar grows, tourists become more discriminating. The argument that "we must approve all development in any form or we will be looked at as being anti-development", ignores the strong market appeal of quality design considerations and the equally strong visitors perception of poor design.

Bad development is not good for anyone - the tourist, the hotelier trying to attract more tourists, or the residents who are increasingly dependent on tourist dollars (or yen) to maintain a certain standard of living. The standard that all must strive for is a higher level of quality as far as the built environment is concerned. This is where Performance Standards become effective.

These Standards will require that all new development meet certain requirements with respect to the provision of landscaping, installing curb cuts to control access to and from the property, protecting existing vegetation, etc. It is in Intensity District 4 where the opportunity for the greatest mix of uses occurs. In order for the development of all proposed Intensity District 4 areas to be carried out successfully, strict adherence to all applicable Performance Standards will be critical.

Immediately east of this area in Tamuning lies the Harmon Industrial Area. While this site has evolved into one of the larger warehousing/manufacturing areas on the island, it also provides an example of the practical limits on the mixing of land use types.

Intermingled with the more industrial type of activities in the area are higher density housing. While this Plan espouses a mixing of land uses, there are limits to this concept. The placement of housing next to industrial or warehousing activities goes beyond these limits. On the one hand, the intrusion of residential development can have an adverse effect on the efficiency of industrial operations. And, on the other, the net effect of placing housing in this type of area is likely to result in a steady degradation of the residential structures in the not-too-distant future. Therefore, while this area is proposed to be designated as Intensity District 8 (Industrial/Port), residential development is no longer one of the uses that should occur here.

The Downtown Agana area has been designated as Intensity District 6 (Urban/District Center). Agana is proposed to be the business, financial, and governmental center of the island. If this can be achieved, then an expansion in retail trade can be anticipated in this area.

The dynamic interaction of a successfully functioning downtown is envisioned for Agana. If a critical mass of people are working in banks and Government and private offices, a "captive audience" is established who will patronize restaurants and other retail outlets in the area - without having to use their cars. This "captive audience" concept should be expanded to include the provision of medium to high density housing in the area as well. For, if this effort is successful, people will be able to work and shop in Agana with little or no need for their automobiles.

To the extent that all of this can be achieved will reduce the need to provide much of the off-street parking that is currently envisioned as being necessary to support Agana's redevelopment efforts. This is not to say that off-street parking needs will go away if what is proposed and envisioned comes to pass; rather, the massive amounts that would be needed (if current trends were to continue) can be reduced significantly.

Surrounding Agana, in the Maite, Mongmong, and a portion of the Agana Heights areas, the lands are proposed for inclusion in the Intensity District 4 (High Intensity). The development of higher density housing in these areas would reinforce the redevelopment and revitalization of Agana.

Moving further east and south, along Route 8 encompassing Toto, Barrigada, and Mangilao, these areas are proposed as Moderate Intensity Districts (Intensity District 3). They are envisioned to be primarily residential areas built to moderate density standards, with churches, schools, clinics, and some limited commercial development being allowed. This District also permits colleges and universities, including the University of Guam and Guam Community College. At the intersection of Routes 8, 10 and 16, a high intensity node (Intensity District 4) is proposed to recognize this growing educational / residential / and commercial centers, and taking into account traffic volumes and a natural tendency to look at these types of intersections for more intensive development.

From Fadian Point to Togcha, along the east coast of Mangilao, Chalan Pago, and Yona, is established a low intensity Marine District, 2M. This is situated below the cliff lines along the shore. It is intended to continue the activities of the Guam Aquaculture Development and Training Center and the University of Guam Marine Lab in this area, as well as promoting the planned aquarium, recreational fisheries, aquaculture and marine biotechnology in this zone, maintaining and utilizing its pristine sources of water.

Southeast of Agana, along Route 4, including the western portion of Agana Heights and all of Sinajana,

these communities are proposed to be designated as Intensity District 3 (Moderate Intensity). Medium density housing, including possibly some townhomes, patio homes, zero-lot line homes, and low-rise (two to three stories) could be developed in these areas, as well as churches, clinics, schools, some limited retail outlets, and recreational facilities.

Further south and east along Route 4, in Chalan Pago Ordot, an area of Intensity District 2 (Low Intensity) has been proposed. Low density single family homes, planned unit developments, educational and recreational facilities, clinics, houses of worship, and very limited retail operations would be permitted in these areas.

The Asan and Piti communities have been designated primarily as Intensity District 3 (Moderate Intensity). Asan will face development constraints in the future until the GHURA redevelopment efforts have been completed.

The civilian and military portion of the port facilities at Apra Harbor should carry the designation of Intensity District 8 (Industrial/Port) to promote the development of the marine industry. Warehousing and distribution facilities, harbor and marine support operations, and seafood processing/packing facilities are activities that would be appropriate in this area.

The area immediately west of the Village of Yona, as well as Yona itself, are proposed to be designated as Intensity District 3 (Moderate Intensity). For the area west of Yona, this is to take into account the Manengon Hills/Leo Palace currently being developed. This project, when it is completed, will likely have a synergistic effect on Yona itself, creating greater pressures for development in the area. By recognizing this eventuality now and calling for a land intensity designation that is realistic will make it easier to deal with growth management issues in the future.

The Agat/Santa Rita area is proposed for a mix of moderate to high intensity development (Intensity Districts 3 and 4) in the future. Straddling Route 2 in this sector, Intensity District 4 is designated, that would allow multi-family housing, motels/hotels, clinics, commercial development, and offices. Off the main road, moderate intensity development is considered more appropriate. Limited multi-family housing, single family homes on small lots, townhouses, neighborhood retail facilities, churches, schools, and clinics are envisioned here.

The southern Villages, including Umatac, Merizo, Inarajan, and Talofofo are proposed to retain their village character to the greatest extent possible. The hearts of these communities are proposed to have an Intensity District 5 (Village/Neighborhood Center) designation. This would allow limited commercial development; churches; community centers; nursery and elementary schools; police, fire, and postal substations; some townhouse and low rise multi-family housing; and bed and breakfast type

accommodations. Surrounding these nodes are suggested areas of moderate intensity development (Intensity District 3).

Within the legally recognized historic district of old Inarajan village, an intensity district of 5H (Historic Village Center) has been designated.

These areas could be built to a high-enough intensity to help to sustain the village centers, but would not be so great as to either overwhelm them or to generate such a demand for commercial development as to destroy their integrity. In some rural areas reflecting approved golf course projects, Intensity District 3 (Low Intensity) is proposed. These are either areas where existing development of this magnitude already exists, or where the land configuration is such that it can be supported with minimal impacts on the region.

The majority of the island's rural areas, especially in the southern and northwestern parts of the island which are not owned by the federal or territorial government, have been designated as Intensity District 2 (Low Intensity). Due to natural feature constraints (steep slopes, floodplains, wetlands, etc.); ownership designations (National or Territorial Park lands); the desire of the island's residents; the need to retain the Territory's best agricultural land; and the need to prepare a rational, defensible, and balanced Land Use Plan, these areas have been designated for low intensity uses such as agriculture, single-family homes, duplexes, small-scale commercial operations to support rural development and public facilities. However, there is flexibility for landowners in these areas to accommodate planned unit developments and larger projects. However, these projects must be designed and approved by the TLUC consistent with strict new performance standards to warrant protection of rural areas.

IMPLEMENTATION

INTRODUCTION

The goal of planning for future development in any comprehensive planning process is to achieve in the future, a society that is more equitable, efficient, and less harmful to the environment than the present situation. Usually, the process involved mirrors the rational planning process:

- Develop an inventory of existing conditions;*
- Identify problems and opportunities;*
- Develop alternative plans;*
- Evaluate alternative plans;*
- Select the appropriate alternative;*
- Develop final plans;*

-
- Develop implementation programs; and*
 - Continue to review.*

The planning process is not entirely rational and, in many cases, is irrational if viewed exclusively through the rubric of the rational planning process. Such influences as monetary limitations, natural occurrences (i.e. typhoons), and political realities, affect the process. Its mechanistic steps are unrealistic. Plans that do not take into consideration factors other than technical issues are bound to sit on the shelf and collect dust, never to be implemented. The process used in the preparation of this Plan has sought to overcome and pre-empt some of the problems that traditionally have plagued the planning process. This has been done to improve the implementation mechanisms.

The planning process used was one that involved considerable public participation at all levels. Citizen meetings were held at all critical times in the preparation of the Plan to insure that the public interest was being served.

The critical questions involved in the process are: *where are we now?, where do we want to be?, and how will we get there?* These questions have allowed the Government of Guam and its citizens to gain a clear picture of the present status of development, the desired future conditions (given acceptance of the Plan), and a means of making these desired conditions a reality.

Various documents and research efforts have been focused on answering the questions posed in the preceding paragraph. The Inventory and Analysis of Existing Conditions Report details the present conditions, environmental and man-made, in the Territory. The Alternative Concept Plans Report described the alternative future development scenarios available to Guam. The Land Use Plan describes the scenario that best suits the desires of the residents of Guam. The Zoning Plan, in conjunction with the new Zoning Code, answers the third question; *how will we get there?*

ZONING PLAN

A living community is not static. A place cannot be frozen in time. Thus, as communities evolve, so too should efforts to ensure their success. Similarly, observations on what ingredients work to make a community an alive and thriving organism continually change in response to changing needs, opportunities, and circumstances. Successful communities continually experiment with a wide range of growth management techniques to retain distinctiveness and protect key natural and cultural assets.

In virtually every American community, planners, elected officials, and citizens look to zoning to control their destiny. Zoning has long reigned as the major tool in the planner's arsenal. This has been the case since 1916, when New York City enacted the first comprehensive zoning ordinance. By 1926, the

GUAM 2015 GENERALIZED LAND USE PLAN

PHILIPPINE SEA

PACIFIC OCEAN

LEGEND

-  I. D. 1 : PARKS
-  I. D. 2 : LOW INTENSITY
-  I. D. 2M : LOW INTENSITY, MARINE
-  I. D. 3 : MODERATE INTENSITY
-  I. D. 4 : HIGH INTENSITY
-  I. D. 5 : VILLAGE/NEIGHBORHOOD CENTERS
-  I. D. 5H : HISTORIC VILLAGE CENTERS
-  I. D. 6 : URBAN/DISTRICT CENTERS
-  I. D. 7 : HOTEL/RESORT
-  I. D. 8 : INDUSTRIAL/PORT FACILITIES
-  MILITARY LANDS
-  FEDERAL RELEASABLE LANDS

00,000 0 60,000 120,000 240,000

1:96,000

MAY 1994

Source: W.B.F. / S.P.G., Joint Venture

Supreme Court put to rest any doubt that zoning laws, which restricted an individual's right to develop his property in any way that he saw fit, were constitutional exercises of a community's police power.

In the landmark case known as the *Village of Euclid (Ohio) vs. Ambler Realty Company*, the high court upheld the validity of an ordinance (or law) that divided all of the community's area into separate zoning districts, and prescribed minimum dimensional and density requirements for all permitted uses. Today, "Euclidean Zoning" (as it has come to be known) exists in virtually every community in the country, including Guam. The theory of this approach is that the separation of land into distinct districts allows for the sorting of uses based on their compatibility.

Although the history of Euclidean zoning spans approximately 65 years now, its promise as an effective land regulatory measure has not been fulfilled. Zoning, in and of itself, has failed to protect the environment: forests have been felled, floodplains and coastal areas have been filled, and agricultural lands have been destroyed. While public opinion often casts developers in the role as villains, the truth is that zoning laws have failed to prohibit such activities and has, as a matter of fact, encouraged them. The nemesis of planners - "urban sprawl" - is not due to any absence of planning or zoning; it is zoned to achieve precisely this land development pattern.

The zoning map that was enacted as part of the Zoning Law that the Territory uses was based upon continental United States models. While some mainland communities might be quite receptive to low-density land development patterns, it is often inappropriate in Guam, with its finite land resources and mountainous terrain.

The existing Guam Land Use Plan was created in 1966 and subsequently adopted by the Legislature. A zoning ordinance was adopted the same year in accordance with the Land Use Plan. Since that time, the Territory has experienced significant growth pressures. GovGuam undertook a series of land use planning efforts in the 1970's and 1980's to respond to the changing economic market forces on the island. However, updated land use plans were never adopted by the Legislature.

Escalation of land values (primarily from foreign investment) and frequent rezonings to accommodate new tourism-oriented development (and the off-island job immigration which followed) quickly outpaced the ability of the Land Use Plan and zoning ordinance to act as adequate "guides" in the land use decision-making process. Today, land development remains largely regulated and guided by the same zoning originally established in 1966. The reliance on this Zoning Code to foresee future development directions and infrastructure capabilities in the 1990's and beyond creates severe limitations on the decision-making process for today's development proposals.

The land development regulatory process in Guam is based on traditional zoning and subdivision regulations. While these techniques have been successful in preventing extremely harmful growth patterns, it has been found that several weaknesses exist which, if combined with a continued strong market demand for growth, pose several problems for future development management in the Territory. These findings are highlighted in the following paragraphs.

- Changes in zoning are occurring on a site-by-site basis independent of the eventual design which would ultimately determine the compatibility of the proposed land use with the surrounding neighborhood. Under the existing Zoning Law, some uses are not allowed in districts where similar uses are permitted with no logical basis for such differentiation. Instead, conditional uses are allowed in many districts. These land uses are often approved without meeting the "conditions" required as a part of the Law. This indicates that the regulations may inadequately address the impacts generated by certain uses. The use of variances is also widespread both in "bulk" type (e.g., setbacks, lot coverages) and "use" variances. The latter are an illegal "relief" mechanism for which the "hardship test" is better met through a more thorough rezoning (amendment) process.
- Too often, "what it takes to get by" is the standard level of creativity fostered by traditional development regulations. The existing regulations, (especially the subdivision regulations) offer little opportunity i.e., incentives, for creative design. In fact, it is not uncommon for developers to request and be granted waivers of very basic improvements for sidewalks, curb and gutters and other improvements. This leads to the development of more rural type development patterns, e.g., dirt road subdivisions, in otherwise urban or developing areas. These practices have subsequently led to the expenditure of massive public funds to correct these problems after a subdivision has been occupied and residents demand paved roads and sidewalks. Furthermore, no mechanism exists to relate zone changes or other similar requests to be consistent with the Land Use Plan. In essence, the "guiding" ability of the Plan is lost upon the process.
- The existing approach to development evaluation often overlooks some significant adverse impacts. Conventional zoning does not always contain necessary standards for the protection of landowners and the environment. Frequently, such potential impacts are brought to light through the technical review of proposed development by the Development Review Committee. However, too often, such recommended actions to correct adverse impacts are not included as a part of the final action taken by decision-making bodies. At the same time, there are few guidelines and criteria for the review of proposed development, and statutory authority to enforce mitigating measures is largely lacking. The increasing use of Executive Orders in the land regulatory process is indicative of the growing need to respond

more clearly to the needs and requirements of new development. Yet, a more comprehensive approach is still needed which should include enabling legislation to provide the statutory authority necessary to adequately enforce the land use regulatory process. There have been, for example, instances of substantial violation of wetland preservation requirements on the island which could have been avoided with a stronger enforcement presence.

- Conventional zoning regulations are often labelled as being unpredictable. Zoning has always involved two conflicting interests--the neighboring landowner who wants the property to remain vacant or at a lower or identical use, and a developer who desires a higher intensity use. In the case of Guam, the TLUC and the Legislature must determine whose interests prevail. One must win, the other must lose. The rules of zoning do not allow much latitude. Interestingly enough, the process is often viewed as being too predictable in the Territory insofar as the TLUC is perceived by the public as "always granting approval" to proposed projects. Citizen input into the development review process is often too late to have any positive effect. This underscores the shortcomings within the existing regulations to consider public input and the lack of explicit criteria to evaluate development. Limited public input is further evidenced by the lack of challenges to many land use decisions and a relatively low level of public participation and intervention in the development review process.
- The ever-changing commercial and residential market place has responded to the need for flexibility far more quickly than have traditional zoning and subdivision regulations. As development pressures increase, so to do the demands on public staff time to review large-scale projects. The limited review time, staff size, and large amount of technical review required often creates unrealistic deadlines and creates problems for enforcement of actions or conditions attached to actions. Catch-all enforcement of development approvals is usually the responsibility of the DPW in terms of checking conditions which may have been attached to development approvals by other agencies through the permitting process. Other agencies may be responsible for certain other permitting functions, such as GEPA. Yet, poor feedback mechanisms in the review process, compounded by increasing work loads and the lack of statutory authority, often mean that performance conditions are not strictly enforced.

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- The legislative rezoning process is a notoriously poor "predictor" of demands in the market place. Speculative rezoning often results in erratic fluctuations of market value and often times results in poor locational choices for land uses which might be best suited for other uses in terms of the island's overall needs. This process also undermines the validity of the existing Zoning Law and the development review process. Further, it erodes public confidence in the process and exhibits little consideration for impact evaluation.
 - Finally, a major reason conventional zoning often fails as a tool of land use planning is the requirement that all land be zoned. What has occurred as a result, is that the majority of the island has been zoned for agricultural or very low intensity uses in spite of both the developer's and the Government's knowledge that significant changes in zoning will be required as development pressures increase. This has a tendency to bring doubt as to the true intent of the agricultural zone. The zone functions more as a "holding zone" in reserving land for some, as yet undetermined, higher intensity future land use. At the same time, as low intensity (A and R-1) zones are developed in these areas, it creates pressure to maintain those densities, despite what that particular area might be best suited for in terms of the island's overall needs.

Based on the review of existing regulatory and zoning mechanisms, a new "performance-based" approach to land development regulations is incorporated in the Land Use Plan and embodied in the new Zoning Code to correct these deficiencies. However, in order to implement the 25 year planning horizon of I Tano'-ta, and achieve the desired future land use patterns on the island, new zoning maps have been prepared based on development steps that should be taken in the short-term (the next five years) to maintain an adequate level of public services discussed in the Plan.

The Zoning Code provides for the orderly timing of growth consistent with the availability of public services and facilities and planned capital improvements during the next five years. The Zoning Code is intended to prevent premature development from occurring in areas where public facilities are not yet provided or planned to be provided within the next five years, and therefore cause further degradation to environmental and quality of life conditions.

The zoning maps that accompany the new Zoning Code will largely coincide with the Land Use Plan map for the island. The Zoning Code itself will regulate all permitted uses and structures as a function of the particular impacts that are inherent in each use. These impacts will vary for the same use, depending on the intensity of that use proposed by the developer and where that use is planned to be located.

Because performance-based zoning districts are carefully designed on the basis of intensity distinctions, geographic considerations, and community fiscal and planning policy, they must be mapped with special care. Thereafter, re-zoning cases should be minimal because the initial zoning will have already been designed to accommodate development expected over the next five years.

THE ZONING CODE

The failures of traditional zoning indicate a need to explore alternative ways of dealing with land development control mechanisms. As was mentioned earlier, a performance-based approach has been recommended. It is felt that this technique will enable Guam to better plan for its future population while safeguarding the natural, social, and economic qualities that have made it an attractive place to live. This system employs minimum levels of "performance" by setting standards that must be met by each land use type.

It has been the primary intent to allow for greater flexibility by permitting a greater variety of uses to occur in any given intensity district. The difference from the existing regulatory system is that strict adherence to a series of performance standards is required. The premise of the system is that it is not the use that is so important to regulate (although there are obvious incongruities to be avoided, such as mixing warehousing and storage activities with residential development), as it is the intensity of the use. Also important to consider and control is the intensity of any use, given the physical constraints (or opportunities) that exist in the area where the activity is proposed. For example, although multi-family housing is allowed in a number of different intensity districts, the degree to which this development may occur will depend on how steeply the land is sloped, whether stormwater runoff can be controlled on the site, if there are any floodplains that must be dealt with, if protection of groundwater resources is an issue in the area, etc.

APPENDIX A
COMMUNITY ADVISORY COMMITTEE (CAC)

NAME	AFFILIATION
John Vega/Alvin Olivarez	Filipino Community of Guam
Luchie Jones	Soroptomist International
Mo Cotton/Carl Dominguez	Guam Board of Realtors
Fred Estabrook	Tumon Bay Rotary Club
Cynthia Jackson	Northern Rotary Club
Dr. Lynn Raulerson	Marianas Audubon Society
Felix Benavente	Micronesia Association of Planners
Tony Artero	Artero Realty
Milton Franke	Baba Corporation
Joseph T. Duenas	Guam Rotary
Dr. Lawrence Kasperbauer	Board of Education
Karen Storts	Guam Contractor's Association
Ben Toves	Association of Life Underwriters
Evan Montel-Cohen	Comm. on Guam's Future
Dr. Judith Gutherz	University of Guam
Juan Tenorio	Professional Engineer/Architect/Surveyor
Benit Camacho	Nasion Chamoru
Robert Kao	Chinese Association of Guam
Jack Cross	Money Resources, Inc.
Reggie Reyes	Lions
John Blanthorne	Guam Banking Association
Mary Louis Anderson	Box 7175, Tamuning 96931
Various Members	Am. Institute of Architects Guam Chapter

APPENDIX A

(Continuation...)

TECHNICAL ADVISORY COMMITTEE (TAC)

NAME	AFFILIATION
Richard Davis	Department of Parks and Recreation
David Lotz	Department of Parks and Recreation
Pete Toves	COMNAVMAR
Keith Spencer	COMNAVMAR
Tom Jones	GAA
Dr. O.V. Natarajan	PH & SS
Joan B. Perry/James Kocsis	Soil Conservation Service
Greg Yamanaka	Soil Conservation Service
Lt. Col. Ronald T. Rand	13 AF/63 3rd ABW
Captain Blair Lecker	633 CES/DEEP
Paul T. Salencia	633 CES/DEEP
Gary Hiles/Cathy Cruz	Department of Labor
Bob Anderson	DAg Div. of Aquatic & Wildlife Resources
Bart Lawrence	DAg Div. of Forestry
Mike Wilder/Ron Strong	Pacific Basin Environmental Consultants
Greg Hartkoptf	Pacific Basin Environmental Consultants
Linda Sablan/Martha Rubic	Department of Commerce
Bill FitzGerald	Department of Commerce
Carl Petersen	Territorial Land Use Commission
Alex Chan/Frank Cabrera	PUAG
Rose S.N. Manibusan	National Park Service
Joe Santos	Department of Land Management
Gary Stillberger	GEPA
Tom Marler	UOG-CALS
Kimbley S.A. Lujan	GEDA
Vicente Blas	GEDA
Jesus Q. Ninete, Sr./Tony Quinata	Department of Public Works
Jesus Ramirez/Dionisio DeLeon	Department of Public Works
Mike Cruz/Mike Ham	Bureau of Planning
Dr. Bob Richmond	UOG Marine Lab
Larry Iriarte	GPA
Frank Dayton	Army Corps of Engineers
Rufo Lujan	Department of Agriculture
Dr. Sharam Khosrowpanah	WERI
Fred F. Blas	Guam Fire Department
Ray Torres	DPW Highway Planning
John Anderson	Department of Land Management
Felix Dungca	Department of Land Management
Mike Gawel	Territorial Planning Council
Manny Leon Guerrero	Territorial Planning Council
Marcel G. Camacho	Territorial Planning Council



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