# LAND-USE DISTRICTING PLAN

Prepared by: Bureau of Planning
1980

# LAND-USE DISTRICTING PLAN

## GUAM

Bureau of Planning
Government of Guam
Agana, Guam

The preparation of this document was funded in part by Grant No. NA-79-AA-D-CZ098 from the U.S. Department of Commerce, Office of Coastal Zone Management, Washington, D.C.

1980

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

# I. OVERVIEW

## A. Purpose and Use of the Plan

The most important factor determining the quality of our environment is the use we make of our land and water resources. The purpose of the Land-Use Districting Plan is to establish a long-range blueprint for development on Guam. Envisioned growth takes place in a manner which reflects the need for expansion in all social and economic sectors but, at the same time, recognizes the need for establishing guidelines for growth in areas where unplanned development would have a significant negative impact upon the well-being of the people of Guam.

The Land-Use Districting Plan is designed to provide an official guide to the future development of Guam for the use of the Territorial Planning Commission, the Governor, the Legislature, other concerned governmental agencies, property owners, businessmen and the general public. The Plan provides a reference to be used when considering zone changes, tract maps, variances, conditional uses and other land use actions.

The Plan designates a generalized pattern of land use designed to meet the existing and anticipated needs of the island to the year 2000 while contributing to a healthful and pleasant environment, balancing growth and preservation for the future, saving what is positive of past development and attempting to rectify developmentally caused problems. More than enough acreage is provided in the Urban and Rural categories to meet the Island's needs to the year 2000. The Plan thus has flexibility which allows for the unexpected needs that history often sees happen. The revision process built into the plan also allows it to more sensitively respond to the dynamic factors which influence development. The Plan is

not an official zone map and while it is a guide it does not confer an implicit right to a specific use or zone.

To use the Plan, find the parcel in question on the Land-Use Districting Map. The color will indicate the use district. The Land Use Definitions starting on Page 47 will give a general idea of what uses would be considered compatible with the district. Then the user should consult the Land Use Policies beginning on Page 21 to see if the proposed development would conflict with the Plan's guiding policies.

B. Approach

If the island of Guam was much larger, if we had a great abundance and variety of resources, and if the population growth was much lower, we would not have to worry as much about what type of development would occur and where. Since Guam is small (212 square miles), much of the land is owned by the Federal government (31.5%), resources are few and limited, and the growth rates relatively high, we must seek a balance of proposed development against the public benefit gained from that development. Due to our limited land area, we must assure that this balance recognizes both the need for growth, and the location of that growth in areas which can support it without producing unacceptable impacts on both the land and people of Guam. (See Figure 1).

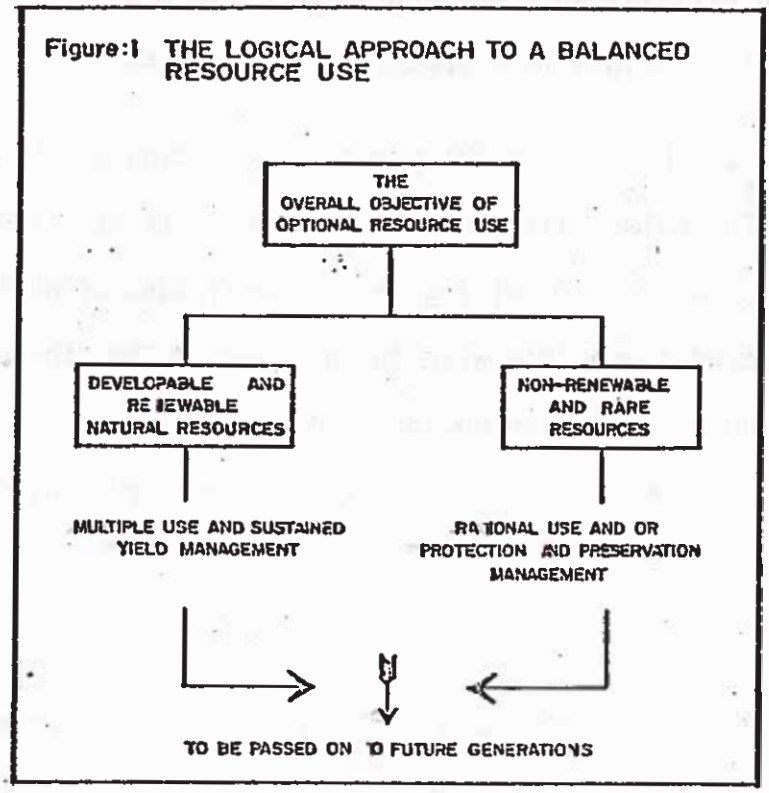
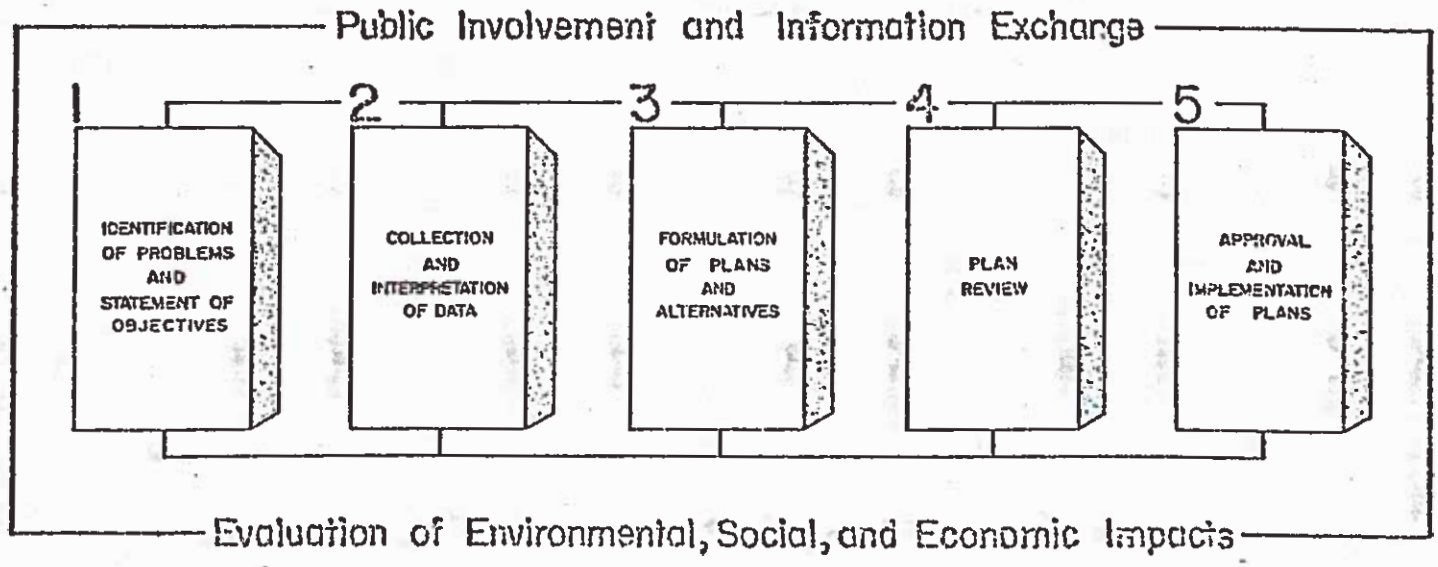



Figure:2 THE LAND-USE PLANNING PROCESS



C. Relation to Master Plan

The Land-Use Districting Plan is an integral element of a broader planning process which also includes such elements as a recreation element and a conservation element. The land-use part of the overall plan is the physical interpretation of appropriate other elements of the plan on the geographic areas of Guam. It is primarily concerned with the arrangement and types of land use, their impact upon the environment, and relation to community development.

Basically, the planning process consists of a number of conceptually distinct phases as shown in Figure 2.

D. Objectives

The major objective of the Land-Use Districting Plan can be expressed in a single statement: "to organize, coordinate, and guide the proces of growth-caused development to protect what the people of Guam most value as the environmental, cultural, and aesthetic characteristics of the island while meeting the essential needs of an increasing populati

Growth will occur. If it occurs randomly it will be more wasteful of resources, more expensive to provide with services and infrastructure, will not function as efficiently, and not be as pleasant a human envir ment. Planning for where growth is most appropriate and in what concentration can ameliorate these problems. The following basic objectives were established for the Land-Use Districting Plan.

- Create an environment that promotes the general health and welfare, provides for all land uses and choices among living, working, cultural, and recreational opportunities.
- Develop Guam's natural resources according to a balanced management program. This involves rational use of renewable and non-renewable resources and protection of those areas, both natural and manmade, which are critical to our health, safety and welfare.

- Develop Guam's recreational resources to satisfy the desires of visitors and residents, and to protect the island's scenic vistas, historic sites, natural areas, and beaches.

- Preserve and promote Guam's historical and cultural heritage so that future generations may understand their past as well as their development as a society.

- Assure that safe, sanitary housing is available within the financial reach of every family.

- Continue on the road to self-sufficiency and manageable economic growth by developing a broad-based economy emphasizing military activity, small business, tourism, agriculture, and fishing.

## II. PHYSICAL AND CULTURAL SETTING

### A. General Physical Characteristics

Guam is the southernmost and largest island in the Marianas Chain, an archipelago in the Southwest Pacific. It lies 13° 28'29"N and 144° 44'55"E at Agana, the capital city situated centrally on the western coast. The island is approximately 30 miles in length with a northern width of 8½ miles and a maximum southern width of 11½ miles. Northern and southern land areas taper at the central waist to a width of 4 miles. Excluding reef areas, the land area is 212 square miles or 550 square kilometers. The axis of the island is in a northeast-southwest direction. Guam is generally classified as a high island with 12 small islands along the reef. The largest offshore island is Cocos Island, a raised portion of the barrier reef encircling an atoll-like lagoon.

### B. Climatic and Seismic Conditions

Generally, the climate on Guam is warm and humid regardless of time of year. The relative humidity commonly exceeds 84% at night, all year long, and the average humidity is at least 66% every month. The daytime temperatures are commonly between 83 and 88 degrees with night temperatures falling to the mid-seventies during the coolest part of the evening. The two distinct climatic seasons on Guam are the wet and dry seasons. The dry season is generally from January to May and the wet season from July to November. December and June are considered transitional months. The mean annual rainfall ranges from approximately 80" along the coast to 95" for the higher mountains

areas; 20-24% of the annual precipitation falls in the dry season and 63-66% in the wet season. The remaining rainfall occurs during the transitional months. A great deal of variation in rainfall can occur from year to year. In 1952, a maximum of 145.45" was recorded with a minimum of 60.42" of rain recorded in 1955. Severe droughts are a normal occurrence on Guam. The period of greatest drought hazard is February through April. Inversely, intense rainfall can occur with tropical storms or typhoons. Small-scale storms or squalls can occur at any time with varying frequency and character. Major storms or typhoons, with winds greater than 65 knots, have made direct hits on Guam. The likelihood of typhoons is greatest during July through September. However, as evidenced by the last direct hit, they may occur during any month. On May 21, 1976, Typhoon Pamela devastated the island with recorded sustained winds of 115 mph and recorded gusts to 159 mph.

Located 70 miles southwest of the Marianas Trench, Guam is subject to earthquakes and seismic sea waves at presently unpredictable frequency and intensity. Devastating sea waves have been absent during recorded history. Numerous earthquakes and tremors have occurred with the most damaging quake being recorded in 1902. Guam is structurally divided into six blocks by seismic fault zones that are defined by distinct divisions in the land surface.

C. Northern Guam

The northern half of Guam is geographically characterized by a raised limestone plateau with a maximum elevation of 600 feet which gently slopes downward in a southwestern trend to less than 100 feet in the central mid-section of the island. The northern limestone is composed of the consolidated remains of reef coral and sediments. The northern

limestone terraces and cliffs represent an ancient barrier reef, with the inland limestone terrain comprised of the remains of the lagoon sediments. The central limestone is hard and valuable for mineral extraction. As it is extremely permeable, rainfall quickly soaks into the ground and recharges the aquifer. Although there are three major recharge areas, all of Northern Guam is considered the principal source aquifer area.

A very thin soil layer covers most of the northern limestone and hosts forest vegetation known as the limestone forest. The limestone forest is comprised of trees that form a canopy for understory shrubs, herbs, epiphytes, and lianas, many of which grow from bare limestone. Many of the areas of limestone forest have been cleared by wartime efforts and postwar urban and military developments. The remaining areas are concentrated along coastal slopes and represent the critical habitat for many of Guam's endangered plants and animals.

The northern limestone plateau is interrupted by volcanic exposures at Macheche Hill and Mt. Santa Rosa. The volcanic rock is exposed at Mt. Santa Rosa and has resulted in the buildup of lateritic clay soil along an adjacent inland area. This region represents the major agricultural land in the northern half of the island.

D. Central Guam

Geologically, the central waist of Guam, from Agana to Pago Bay, repre a transitional zone between the northern limestone and southern volcan formations. The relief features are characterized by sloping hills intersected by low-lying basins that are periodically flooded during the wet season. They appear as grassy flats and are important for rec

of the central aquifer. The central aquifer is the smallest lens, yet least affected by saltwater intrusion because it is 'perched' on volcanic rock rather than floating on seawater. It reaches the surface at Agana Springs and disperses water over a floodplain or wetland wildlife habitat, known as Agana Swamp, which eventually flows into Agana Bay via Agana River -- the northernmost river on Guam.

Despite the small land area, geologic characteristics and unique ecology of Central Guam, the area is the location of the major concentration of urban development on the island. Approximately 30% of the island's population resides in this small land area. Commercial, industrial and residential development has expanded from Agana, the major trade center and seat of both governmental and religious power structure.

E. Southern Guam

The southern half of the island is geologically characterized by two distinct volcanic formations that developed in different geological eras. The mountainous ridge adjacent to Central Guam, is the oldest formation. The highest peak is Mt. Alutom at 1,076 feet. The southern range, known as the Umatac formation, is characterized by high peaks or a cuestal ridge that is steep on the seaward side and gently slopes inland toward the interior basin where the two formations merge. The highest peak is Mt. Lamlam at 1,334 feet. The rugged upland surfaces of volcanic areas are weathered and conspicuous erosion scars are present. Major land areas, however, are covered with savannah grasslands that have adapted to the dry and nutrient deficient clay soils of the upper slopes. Water quickly drains from sloped surfaces and forms a surface drainage pattern that comprises the freshwater resources of Southern Guam. A relatively small amount of rainfall soaks into the underlying rock strata. More than 40 rivers and streams form a surface drainage pattern that dissects

the volcanic regions. These rivers flow into the sea at coastal embayr where floodplains and wetlands typify the estuarine areas. A heavy growth of tropical vegetation borders the inland areas of rivers and represents a plant community known as the ravine forest. Sharp divisi between the savannah grasslands and ravine forest lend a particularly aesthetic contrast to Southern Guam. The southern uplands are some of the only expanses of unspoiled terrain on Guam.

Only 24% of the island's population resides in southern communities because of terrain restrictions. Village centers are most often along coastal lowlands with a traditional lifestyle and architecture produci a sharp contrast with northern and central urban development patterns. The reliance on farming and fishing for subsistence is more persistent in the south. Topographic, geologic and ecological conditions have ca the deposition of fertile soil into southern interior basins. Large tracts of prime agricultrual lands lie between the southern communitie Inarajan and Talofofo. Other portions of the interior basin, where th two major volcanic formations meet, however, are characterized by erod eef coral that forms a jagged Karst topography. These areas are concentrated on federally restricted property near the Fena Reservoir, man-made reservoir that supplies 25% of the island's water production.

F. Coastal Features

Much of Guam is surrounded by coral reef, a diversified ecological community that is represented by different types at different location The northern coastline is generally characterized by an immediate reef front at the base of steep cliffs. However, as sandy beaches occur, the presence of a reef flat becomes more prevalent along central and southern shores. The reef flat is a level base of limestone that cons

of the remains of ancient reef coral that has built seaward to the present offshore reef front of living coral. The reef front suppresses the force of all except the largest storm waves and contributes to the buildup of sand along the beaches. As a transition between the reef and beach, the reef flat is sometimes exposed during low tides, however, it represents an important shelter and nursery for many small fish, shellfish, crustaceans, algae and other forms of sea life. Shorebirds of many migratory species find wintering areas and food sources along these reef flats.

Two barrier reefs, which encircle lagoon areas, are represented on Guam. Cocos Island, at the southern extreme is a relatively pristine area that is important as an area for both schools of juvenile deepwater fish and various species associated with the coral community. Apra Harbor, another barrier reef located along the central-west coast, still represents important underwater resources, and is used regularly by snorkelers and scuba divers. Its outward appearance, however, is vitally different than seen at Cocos Island. The offshore Cabras Island and Luminao Reef have been linked and covered with surface development to form the Glass Breakwater. Apra Harbor is the only deepwater port on the island. As the major port area, it serves both the military and civilian communities. Being a strategic location and situated on major trade routes, the harbor is the focal point of the most sea traffic and transshipment in the Western Pacific. Industrial development, in this area, increases yearly to meet islandwide demands for imported supplies and energy development.

Natural shoreline configuration is generally represented by rocky coastline, sandy beaches, mangrove mudflats and river estuaries.

The sandy beaches of Guam comprise a significant portion of the shoreline, 31%. They are sloping landforms composed of unconsolidated sand, gravel, broken shells, coral and foraminifera. Beaches extend landward from the water's edge to a distinct break in the landform or to a point where terrestrial vegetation covers the substrate. They extend seaward as far as the sandy bottom is appreciably affected by the tide, currents and wave movements.

Mangrove mudflats are represented in only two locations on Guam. An extensive stand of mangrove species is found along the inner shore of Apra Harbor. The other area of mangrove shoreline is along the extreme southern coastline between Merizo and Inarajan, along the inner shoreline of Cocos Lagoon. They assist in natural shoreline stabilization and represent an important ecological community and spawning and nursery area for many species of fish crustaceans and mollusks.

Guam's shoreline is interrupted by numerous bays, most of which are associated with estuaries or river mouths. The surrounding river valleys and immediate edge of the river are wetland communities. A diversity of aquatic plant and animal species rely on the specific environment of estuarine areas for food and habitat. The constant inundation of water also makes these areas valuable for aquaculture development. Beach areas at river mouths are usually formed by a combination of reef material and riverine substances that originate from inland areas. Thus, beaches at embayments have a higher content of solid and organic material than the white sandy beaches.

G. History and Culture

Approximately 1500 B.C., the precontact Chamorros migrated from the direction of islands in Southeast Asia and established multiple chiefdoms. The island was territorially divided and individual royal families, who traced ancestry through a female line, ruled over the common people. The Chamorros flourished with an advanced fishing, horticultural and hunting society. A remarkable diversity of stone age tools, utilizing natural materials such as shell, bone, wood and fibers characterized their adaptive technology. Sporadic warfare among chiefdoms added to the characteristics of the lifestyle. Much cultural reconstruction, however, is speculative and based upon comparisons with similar Pacific cultures and the analysis of remains such as artifacts and skeletons or area features such as the latte stone house supports. From archaeological evidence, it is estimated that the population grew to 80-100,000 members.

Ferdinand Magellan discovered Guam for the Western World in 1521. Rapid colonization by Spanish conquistadores followed, accompanied by a period of warfare, disease and missionization. The population rapidly declined and a Chamorro Mestizo culture emerged as Guam was established as a link in the early trade route between Mexico and the Philippines. The remaining population was centralized in Agana and barrios developed within the city. Many new customs were introduced from Spain, Mexico, the Philippines and other island groups. Major changes in technology took place with the introduction of steel. Ovens replaced underground firepits. Catholicism dominated beliefs in ancient spirits and new foods were introduced. There was a major shift from growing rice to growing corn. The changes happened so rapidly, that historical reports are scarce and brief.

During the Spanish Colonial Period, from 1521-1898, new styles of architecture appeared on Guam. World War II and the effects of time have destroyed many original Spanish structures and only remnants now remain. They include Santa Agueda, Ft. Soledad, Plaza de Espana and Spanish bridges. The bridges, constructed of hand-hewn stones, are seen in Taleyfac, Taelayag, Sella Bay and Agana.

World War II, which added to the disappearance of many structures, left its own unique relics that now have historical value. Massive artillery, tanks, and important battle sites and command posts add another link in the chain of events that lead to the present. Though the Japanese Occupation was relatively short-lived, its impact on the body of cultural knowledge and physical appearance of the island environment was profound. Many existing communities and land-use patterns have developed in response to infrastructure that was originally constructed to service military facilities. Communities such as Talofofo developed around civilian wartime camps. Many coastal areas, such as Agana and Agat had to be completely cleared of rubble and subdivided. Still other communities such as Santa Rita, developed as residents were relocated as a resul of land acquisition by the U. S. military.

Presently, many people value the traditional architecture of southern villages and desire to retain their present appearance. Inarajan's historic district represents the last remaining major concentration of building styles and character with a prewar 19th century flavor. Though this adds to the scenic character of the island, many homeowners wish to improve their property and utilize modern building materials. Many areas of Guam reflect a period of technological transition from frame houses and tin roofs to typhoon-proofed, concrete-based structures. An increasing incidence of subdivision development denotes a trend toward

Land-use patterns and trends affect over 105,000 residents, approximately half of which are of Chamorro Guamanian heritage. Throughout multiple phases of colonial heritage, the Chamorros have adapted to the pressures of introduced lifestyles. They still retain a body of knowledge concerning the island's traditional use of land and sea resources.

A traditional facet of Chamorro culture, the land tenure system, considerably affects the course of development. Within many families, there are multiple owners of property. When several heirs all own title to a single parcel of land, conflicting interests often necessitate non-development. Distribution of land to heirs can also encourage residential development, when for example, land may be in a prime agricultural district. Often, landowners all live together in a traditional extended family relationship, with several generations of relatives residing in adjacent houses. The system of land ownership on Guam is typical of the Pacific. Since the Chamorro Guamanians have been exposed to varied phases of colonial dominance through the years, they have adapted land-use traditions as a countercheck against overdevelopment of land on a fragile sea-bounded island.

In Yona and Sinajana, two central communities on Guam, urban renewal has changed this style of living. Low-cost housing tracts and proposed urban renewal in other communities will further this urbanization process that is changing social and economic patterns. Urban renewal and subdivision planning involves sensitive judgements as to whether extended family settings, shared outdoor kitchens, and random traditional village appearances should yield to a more systematically planned and structurally sound environment. Guam's mounting population pressure and economic changes will further modify traditional land and social patterns. The land use districting plan has provided land use categories where traditional cultural practices can be continued.

## III. POPULATION PROJECTIONS

### A. Background

The changing population pattern of Guam is closely related to Guam's economic situation. These factors of population and economic conditions largely shape both the character of and resource demands placed on particular areas of Guam.

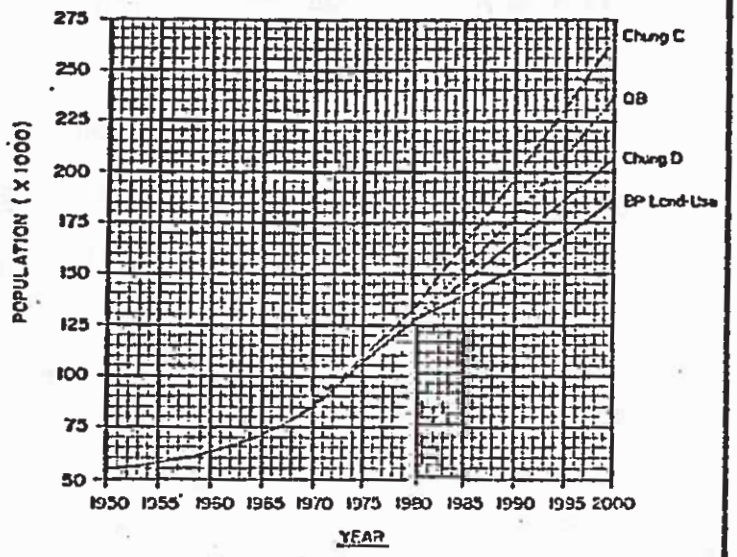
Available data provides a range of projections which vary significantly. Figure 3 summarizes several of the population projections that are available. This range of population projections is comprised of series developed by: Quinton-Budlong, a firm contracted by the Government of Guam in 1972; Professor Roy Chung, a research demographer at the University of Guam in 1970 and the Bureau of Planning.

Table 1 — Selection of Population Projections, 1970 - 2000*

| | | 1970 | 1975 | 1980 | 1990 | 2000 |
|---|---|---|---|---|---|---|
| 1. | Chung (D) | 85,380<br>(63,380) | 105,400<br>(83,400) | 126,000<br>(104,000) | 165,400<br>(143,400) | 206,660<br>(183,660) |
| 2. | QB (B) | 89,890<br>(67,890) | 106,310<br>(84,310) | 126,956<br>(104,956) | 179,352<br>(157,352) | 236,000<br>(214,000) |
| 3. | Chung (C) | 85,380<br>(63,380) | 107,400<br>(85,400) | 132,200<br>(110,200) | 198,000<br>(176,000) | 268,000<br>(246,660) |
| 4. | BP L-USE | | 106,700<br>(84,700) | | | 183,500<br>(167,500) |

*Note: Parentheses ( ) indicate that the constant 22,000 military population is not included.

Figure 3: SELECTION OF POPULATION PROJECTIONS



Using aerial photos, completed in 1975, actual densities for recent housing developments, data relative to planned developments, as well as certain geographic constraints to development, the Bureau of Planning, in cooperation with several agencies, developed area-specific growth projections.

Summary of Municipality Growth Rates to the Year 2000*

| Municipality | Estimated 1980 Population | Projected Population Year 2000 |
|---|---|---|
| Umatac | 700 | 1,600 |
| Agana | 1,094 | 2,550 |
| Asan | 1,440 | 2,700 |
| Piti | 1,570 | 2,645 |
| Merizo | 1,635 | 2,580 |
| Inarajan | 1,790 | 2,765 |
| Agana Heights | 2,125 | 4,000 |
| Talofofo | 2,155 | 2,675 |
| Sinajana | 2,545 | 4,750 |
| Chalan Pago-Ordot | 2,762 | 4,958 |
| Santa Rita | 3,200 | 5,050 |
| Mongmong-Toto-Maite | 4,022 | 5,100 |
| Yona | 4,098 | 8,460 |
| Agat | 4,230 | 9,450 |
| Mangilao | 5,694 | 19,482 |
| Barrigada | 5,818 | 11,474 |
| Yigo | 6,097 | 13,600 |
| Tamuning | 11,849 | 27,500 |
| Dededo | 21,877 | 36,250 |
| TOTALS | 84,701 | 167,589 |

*Does not include military personnel and dependents.

Preliminary results of the recent 1980 Census show Guam's population at 105,816, a 24 percent increase since 1970. Preliminary counts by districts in Guam for 1980 were as follows:

| Districts | 1980 Housing Count | 1980 Population Count | Percent Population Change Since 1970 |
|---|---|---|---|
| Agana | 376 | 881 | - 58 % |
| Agana Heights | 970 | 3,284 | + 4 |
| Agat | 990 | 3,979 | - 8 |
| Asan | 591 | 2,012 | - 23 |
| Barrigada | 1,927 | 7,762 | + 22 |
| Chalan Pago-Ordot | 736 | 3,135 | + 7 |
| Dededo | 5,555 | 23,659 | + 120 |
| Inarajan | 455 | 2,062 | + 9 |
| Mangilao | 2,062 | 6,822 | + 111 |
| Merizo | 396 | 1,658 | + 8 |
| Mongmong-Toto-Maite | 1,483 | 5,230 | - 14 |
| Piti | 502 | 1,521 | + 18 |
| Santa Rita | 2,259 | 10,408 | + 28 |
| Sinajana | 616 | 2,471 | - 30 |
| Talofofo | 447 | 2,016 | + 4 |
| Tamuning | 4,778 | 13,527 | + 32 |
| Umatac | 146 | 732 | - 10 |
| Yigo | 2,892 | 10,424 | - 10 |
| Yona | 1,031 | 4,233 | + 63 |

Using any of the population projections available, sufficient acreage has been designated for urban use to accomodate Guam's population needs through the year 2000.

The preliminary information from the 1980 census indicates that population growth has not been as rapid as earlier projections had theorized. This indication supports our statement that this plan has provided sufficient area for urban accomodation and expansion for the next 20 years. Thus this plan provides flexibility and choice for any proposed use that may arise.

## IV. RECOMMENDED LAND USE POLICIES

To guide the future development of the island, policies were formulated for Governmental processes, development, and resource utilization. The following is a list of these policy recommendations.

SUMMARY

### A. Recommended Governmental Processes Policy

More effective administration of natural resource related laws, programs, and policies shall be achieved through:

- revision of unclear and outdated laws and regulations;
- improved coordination among local agencies;
- improved coordination between territorial and federal agencies;
- educational and training programs for local government personnel, and refinement of supporting technical data;
- discharge of the governments public trust to plan for the good of Guam's present and future population as a whole, balancing private need or desire against the communities' need and good.

### B. Recommended Development Policies

- Shore Area Development

  Only those uses should be located within the Seashore Reserve which: (1) enhance, are compatible with or do not generally detract from the surrounding coastal area's aesthetic and environmental quality and beach accessibility; or (2) can demonstrate dependence on such a location and the lack of feasible alternate sites.

- Urban Development

  Uses permitted only within Commercial, Multi-Family, Industrial, and Resort-Hotel zones; and uses requiring high levels of support facilities should be concentrated within urban districts as outlined on the Land-Use Districting Map.

- Rural Development

  Rural districts shall be designated in which low density residential and agricultural uses will be encouraged. Minimum

lot size for these uses should be one-half acre until adequate infrastructure, including functional sewering, is provided.

- Major Facility Siting

In evaluating the proposed siting of major facilities with the goals, policies and standards of the Land Use Districting Plan, the Territory shall recognize the national interest in the siting of such facilities including those associated with electric power production and transmission, petroleum refining and transmission, port and air installations, solid waste disposal, sewage treatment, and major water reservoir sites.

- Hazardous Areas

Identified hazardous lands including floodplains, erosion-prone areas, air installation crash and sound zones and major fault lines shall be developed only to the extent that such development does not pose unreasonable risks to the health, safety, or welfare of the people of Guam, and complies with land-use regulations.

- Housing

The government shall encourage efficient design of residential areas, restrict such development in areas highly susceptible to natural and manmade hazards, and recognize the limitations of the island's resources to support historical patterns of residental development.

- Transportation

The Territory shall develop an efficient and safe transportatio system while limiting adverse environmental impacts on primary aquifers, beaches, estuaries, and other coastal resources.

- Erosion and Siltation

Development shall be limited in areas of 15% or greater slope by requiring strict compliance with erosion, sedimentation, and land-use district guidelines, as well as other related land-use standards for such areas.

C. Recommended Resource Policies

- Air Quality

All activities and uses shall comply with all local air pollution regulations and all appropriate federal air quality standards in order to ensure the maintenance of Guam's relative high air quality.

- Water Quality

  Safe drinking water shall be assured aquatic recreation, and reef fishing sites shall be protected through the regulation of uses and discharges that pose a pollution threat to Guam's waters, particularly in estuarine, reef and aquifer areas.

- Fragile Areas

  Development in the following types of fragile areas should be regulated to protect their unique character; historic and archaelogic sites, wildlife habitats, pristine marine and terrestrial communities, limestone forests, mangrove stands and other wetlands.

- Living Marine Resources

  Living resources within the territorial waters of Guam, particularly corals and fish, shall be protected from over-harvesting and, in the case of marine mammals, from any taking whatsoever.

- Visual Quality

  Preservation and enhancement of, and respect for the island's scenic resources shall be encouraged through increased enforcement of and compliance with sign, litter, zoning, subdivision, building and related land-use laws, visually objectionable uses shall be located to the maximum extent practicable, so as not to degrade views from scenic overlooks, highways, and trails.

- Recreational Areas

  Development of varied types of recreation facilities shall be located and maintained to be compatible with the surrounding environment and land uses; adequately serve community centers and urban areas, and protect beaches and passive recreational areas such as wildlife and marine conservation areas, scenic overlooks, parks, and historic sites.

- Public Access

  The public's right of unrestricted access shall be ensured on all non-federally owned beach areas and all Territorial recreation areas, parks, scenic overlooks, designated conservatio areas and other public lands; and agreements shall be encouraged with the owners of private and federal property for the provision of reasonable access to, and use of, resources of public nature located on such land.

- Agricultural Lands

  Critical agricultural lands shall be preserved and maintained for agricultural use.

D. Discussion of Issues and Problems

The following problems and issues make it evident that some form of unified land use plan was needed for Guam. In the absence of a detailed lot line mapping system, the Bureau of Planning felt that a broad brush district system should begin Guam's land use planning program. More specific Community Design Plans will be proposed for each village in the future, but the process needs the Land Use Districting Plan as a firm ba from which to make rational decisions to guide Guam's inevitable growth. More actual acreage is proposed for urban and rural use than our populat projections indicate will be needed. This was done to provide choice an flexibility within the system, allowing the individual developer more options while still providing a much needed basis for decision making.

Unplanned Urban Form. The most striking characteristic of the urban pattern on the island of Guam has been the adoption of a random pattern of land utilization and building typology which has resulted in the misu of land and an urban form unsuited to the whole of society. This form i more expensive to provide with service and infrastructure, and is functionally inefficient and wasteful of limited resources.

Particularly evident is the lack of neighborhood design, since all desig efforts are limited to the scale of single buildings. No improvement fo the protection of scenic or aesthetic resources in an urban setting can undertaken unless urban development is conceived within the framework of responsible community design. Proper planning results in a community th functions better and provides a more pleasant human environment.

Any type of land development is expensive, however, there is substantial evidence that the economic costs are strongly affected by development patterns. In terms of total public and private investment costs to

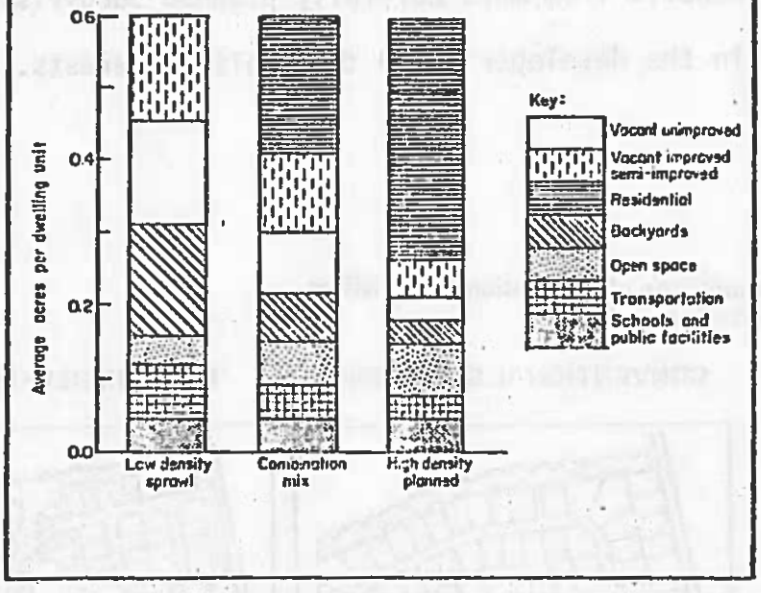
developers, occupants, taxpayers and local government, a study entitled Costs of Sprawl has found that a high density planned community costs 21% less than the combination mix community and 44% less than the low-density sprawl community. Sprawl is the most costly development pattern.

Urban Design. The urban design tools which allow for the protection of natural resources and create a responsible human environment for developed areas, suited to a wide range of residents needs include:

- Block design or cluster housing instead of random single building design. This requires that the buildings in a given area be planned in a coordinated scheme. This design is less costly to provide with infrastructure, provides more open areas and is more land efficient.
- Greater variety of building height in high-density districts.
- Neighborhood density and neighborhood open space ratios.
- Neighborhood view corridors.
- Separation of traffic flow (bicycle, pedestrian, cars) at the neighborhood scale.
- View corridors from densely built areas towards the ocean shoreline, or sloping terrain.
- Integration of neighborhood parks with an urban network of green space pedestrian and bicycle lanes.
- Strict enforcement of setback and landscaping requirements wherever possible.

Planned urban form is based on human scale, community design and neighborhood organization. It provides for greater access to and protection of natural resources, greater energy saving and responsible, aesthetic and efficient development to meet human needs.

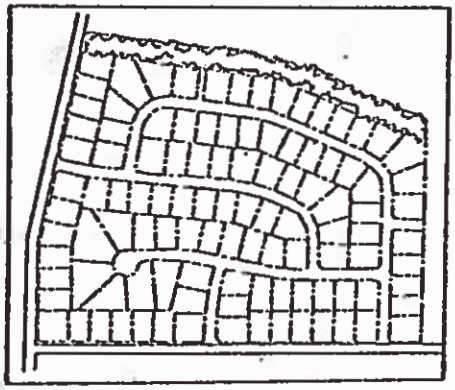
Figure: 5 LAND-USE COST COMPARISON



Cluster Housing. Where possible, low-density residential development should be clustered to retain as much open space as possible. Cluster housing gives an area an aesthetic residential appearance as compared with the symmetrical arrangement of houses in rows and at right angles, where people tend to feel that they occupy one equal place in a rigid pattern of conformity. Even more socially, economically and aesthetically inefficient is random urban sprawl. Traditionally, urban development has randomly consumed vast amounts of land space, leaving little open space for recreation and or environment. Subdivisions can only benefit from more carefully planned subdivision development that is both in the developer's and the public interests.

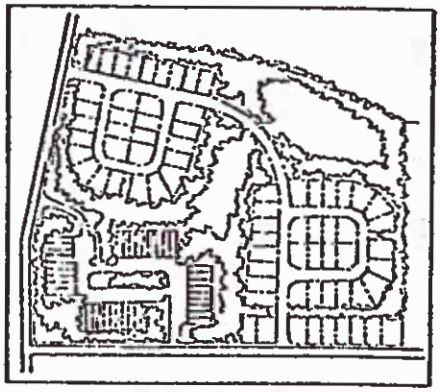
Comparison of Conventional Subdivision and Cluster Development.

CONVENTIONAL SUBDIVISION



Number of lots: 103
Open space: 10%
Linear feet of streets: 5,400
Linear feet of sewer lines: 5,400

CLUSTER DEVELOPMENT



Number of lots: 103
Open space: 50%
Linear feet of streets: 4,900
Linear feet of sewer lines: 3,900

Agricultural Support. The delineation of agricultural districts has specifically been limited to land areas that are fairly level and contain adequate soil conditions. Soil data is concerned with depth, texture, drainage, stoniness, and fertility. The proximity to watershed areas (irrigation sources) enhances agricultural growth potential within individual district areas. Agricultural land, however, is kept at a buffered distance from major surface drainage, rivers or aquifer recharge areas because of the potential adverse effects of pesticides, fertilizers and leachate from animal waste on water quality.

The major potential agricultural areas are in Inarajan, Malojloj, and Talofofo. Smaller areas are in Yona, Merizo, and Umatac. The only area of agricultural land in the northern half of the island is located in Yigo. Inland of Mt. Santa Rosa, soil that has developed as a result of the abrasion of volcanic material has deposited in the areas between Lupog and Mataguac. The total amount of agricultural land that has been districted is approximately 15.5 square miles. With an island of 212 square miles of land surface, the potential agricultural land is roughly 7.3% of the island. This does not sound like much land, however, only a small amount is currently used for agricultural production. The rest should be preserved for agricultural use. With the designation of prime agricultural lands, the needs of farmers can be better realized by government agencies and private interests. Once this limited resource is developed for other uses, it is lost forever and Guam's potential for agricultural self-sufficiency likewise is lost.

Three main factors are utilized in the delineation of agricultural districts. These are aerial photographs that depict topography, soil data, and climate. Land classification has been greatly facilitated

by a set of aerial photographs that were taken in 1975. Aerial photos, with an overlay of contour lines, show such features as slopes, rivers, and existing areas of cultivation. Lands that are level or gently sloping are well adapted for agriculture. Unfortunately they are also the easiest to develop with other uses as well and must be strictly governed. The climate, mostly rainfall, is an important factor in agricultural development, as rainfall is not only needed for crops, but for the replenishment of watershed areas that are necessarily proposed for irrigation purposes. (See Figure 7). Soil data is the basic element in the delineation of agricultural land. The major source of soil data is the Military Geology of Guam, a document prepared by the U.S. Army Corps of Engineers in conjunction with the U.S. Geological Survey in 1959. There have been no exhaustive studies of agricultural land since this date, so this engineering soils study is the basic source of data. As other studies are made, their findings will be analyzed for impact on the Districting Plan, and the Plan adjusted where appropriate. Soil data more specifically analyzes five soil characteristics:

1. Soil Texture. Texture refers to the proportion of sand, silt, and clay in a soil and affects the waterholding and nutrient retention properties, as well as workability of the soil. Medium-texture soils are most desirable for crops. Fine-textured soils can be desirable for wet crops such as taro. Coarse-textured soils such as coral sands are not suitable for crops unless extensive irrigation and fertilizers are used.

2. Soil Depth. Depth refers to the thickness of the soil layer that is available to the roots of plants. Deeper soils provide a larger volume of soil from which the plants can obtain moisture, nutrients, and anchorage.

3. Soil Drainage. Drainage refers to the rapidity and the extent of removal of excess water from the soil. Soils that are well drained are best suited for most crop production. Special crops such as taro and rice can be cultivated on poorly drained soils.

4. Stoniness. Stones in the soil profile or on the surface affect the use of the land, especially if tillage machinery is used. Rocks can hinder or prohibit the use of such machinery.

5. Soil Fertility. Fertility refers to the capacity of the soil to provide the required nutrients to the crop for optimum growth. Some lands require large quantities of fertilizer to maintain optimum crop yields. Soil tests are used to determine the degree of soil fertility.

E. Discussion of Recommended Policies

1. Recommended Government Processes

- Current administration of existing laws and regulations at times does not result in the most effective management of the island's resources. Coordination difficulties create significant confusion among enforcement agencies as to the extent of their jurisdiction.

  When particular agencies with responsibility for enforcement of regulatory controls do not clearly understand the extent of their jurisdiction, alleged violators are allowed, through neglect, to continue and even expand activities which are obviously in direc conflict with the law. Understaffing of regulatory agencies is often cited as a reason for failure to address the violations and enforce or improve the laws, rules, and regulations. Ministeri activities consume time which should be devoted to improving enforcement procedures and planning programs required by law.

- Passage of special interest legislation tends to favor development oriented activities which do not meet standards imposed on activiti reviewed through proper procedures. Such activities may not have undergone consideration for alternate locations, long-range impacts, adjacent uses, or comprehensive planning in general. Bills are proposed and enacted which are in conflict with the intent of existing law, and inconsistent with established policies and procedures for the regulation of land and water use.

Policy--More Effective Administration of natural resource related laws programs, and policies shall be achieved through:

- Revision of unclear and outdated laws and regulations;
- Improved coordination among local agencies;
- Improved coordination between territorial and federal agencies;

. Educational and training programs for local government personne and refinement of supporting technical date.

2. Recommended Development Policies

A. Shore Area Development

. Land resources adjacent to coastal waters have been used w little consideration of the suitability of such land for development or the water-dependency of the uses.

Historical development of major transportation routes immediately adjacent to the shoreline, particularly the 6-mile segment of Marine Drive (Route 2) from Apra Harbor to Tamuning, combined with inappropriate shoreline zoning, has promoted commercial and industrial activity along Guam coastline. Such uses include large auto dealerships, nigh clubs, retail and other similar activities. Many are poor maintained or abandoned and bear no relationship to the adjacent shallow reef flats and sandy beaches. Developmen of this nature continues despite the fact that these areas are eyesores, extremely detrimental to the image of Guam as a scenic island and of greater benefit to the public as park and recreational areas.

. Several coastal communities lack full sewering and typhoon proof housing, suffer from substandard lot sizes, increasi population, poor road conditions, and are in constant dang from severe storm and flood damage.

Geographic access and public utility constraints to inland development have posed serious impediments to expansion of the villages of Asan, Piti, Umatac, Merizo, and, to a degr Inarajan. These villages, constantly beset by water suppl

sewering, road maintenance, and other infrastructural problems are also blessed with superb natural coastal scenic resources. The historic development of these relatively small communities has fostered a closely-knit social structure and the maintenance of traditional land tenure systems. Natural disasters often reduce the attractiveness of these communities.

Policy

Only those uses should be located within the Seashore Reserve Which:

- Enhance, are compatible with or do not generally detract from the surrounding coastal area's aesthetic and environmental quality and beach accessibility; or
- Can demonstrate dependence on such a location and the lack of feasible alternative sites.

B. Urban Development

- Location of high-intensity development areas has been determined in many cases by historical patterns of major facility and infrastructure placement.

  During World War II, roads, airfields and utility systems were developed and located according to strategic guidelines rather than consideration of future land-use needs. Resultant attraction of commercial activities locating on or near these facilities promoted a development pattern inconsistent with the suitability of certain areas to support such uses.

- High impact development, especially intensive residential, commercial, and industrial uses, continue to locate in a random pattern interspersed with residential, recreational, and fragile ecological areas.

In the past, the lack of clear policies in guiding locati of high-impact uses has led to random patterns of urban sprawl, resulting in no general sense of design, compactn or efficiency. Many urban areas suffer from lack of adeq circulation, infrastructure and defined focus for communi design. Fragile resources, including wetlands, limestone forests, beaches, and watershed, have been unnecessarily threatened by such activities and lack of adherence to ge plans. This type of random growth not only detracts from efficiency and aesthetic qualities of a community, but is expensive to supply and maintain with needed infrastructu

Policy

Uses permitted only within commercial, multi-family, industrial, an resort-hotel zones; and uses requiring high levels of support facil should be concentrated within urban districts as outlined on the La Use Districting Map.

C. Rural Development

Uncoordinated and random development of high-intensity ur areas severely limits alternatives for future development places unnecessary pressure on the natural and financial resources of Guam, and discourages retention of certain traditional rural lifestyles.

Certain rural areas have been identified as suitable for future urban use. These areas have suitable physical cha racteristics, topography, and proximity to major roads or infrastructure to support future urban development. Rand development of these areas, without provision of adequate infrastructure or consideration of future development pat

can commit the limited land resources of the island to inappropriate uses. In addition, traditional village and small scale farming activities should be permitted to continu in certain areas.

Policy

Rural districts shall be designated in which low density residential and agricultural uses will be encouraged. Minimum lot size for these uses should be one-half acre until adequate infrastructure, including functional sewering, is provided.

D. Major Facility Siting

- The unavoidable siting of electric power plants and associated energy facilities in shoreline locations will continue to have negative environmental impacts upon coastal waters.

  Electric power generation facilities, given severe geographic constraints, must be located adjacent to the ocean on the leeward side of the island. Prevailing winds, availability of cooling wat needed discharge points for heated effluents, and proximity to petroleum supplies require placement of energy facilities on or ne the shoreline. Dependence on fossil fuels for present electrical generation, as well as the need for ocean water for feasible alternate sources (ocean thermal energy conversion) will continue to place pressures on certain shoreline areas for energy-related development.

- Projected expansion of the Guam Commercial Port, Navy Ammunition Wharf, Naval shipyard facilities, and related support uses, although essential for port operations, may reduce potential recreation areas, destroy marine habitats, threaten the declining bird population, and reduce access to shore areas.

Guam has only one deepwater harbor which must serve all of the island's future needs. Compromises must be made in the near fu in balancing development needs and conservation of fragile resc A multiple-use port facility which emphasizes natural and recreational values, together with needed commercial and industrial facilities, is most desirable.

Policy

In evaluating the consistency of proposed major facilities with the goals, policies, and standards of the Territory of Guam, the Territory shall recognize the national interest in the siting of such facilities including those associated with electric power production and transmission, petroleum refining and transmission, port and air installation, solid waste disposal, sewage treatment, and major reservoir sites.

E. Hazardous Areas

Guam's geographical location and geological structure is s that major natural hazards are a way of life rather than occasional occurrences. Despite this fact, many hazard ar are not yet well regulated or protected from over-develop

Guam lies within both a major typhoon belt and one of the active areas of the Pacific Ocean Basin's "Ring of Fire," zone of intensive seismic activity. Despite the fact tha from 1948-1977 of over 80 tropical storms and typhoons pa within 180 nautical miles have caused over $1 billion in damage, development has continued in flood hazard areas ar coastal areas, as well as in or adjacent to groundwater s Though recently promulgated flood hazard area regulations should adequately address development in these areas, very little information is available relative to performance standards for areas adjacent to the six major and over two dozen minor fault lines on the island.

Policy

Identified hazardous lands including floodplains, erosion-prone areas, air installation compatible sound zones and major fault lines shall be developed only to the extent that such development does not pose unreasonable risks to the health, safety, or welfare of the people of Guam, and complies with land-use regulations.

F. Housing

- High density residential development has taken place within major accident potential zones such as the approach corridor to the Naval Air Station in Central Guam. Residential development has also occurred in floodplains and along Guam's shoreline. These are areas highly vulnerable to damage from natural disasters. Development in such areas continues, in part, due to traditional practices of sub-dividing large tracts of land into parcels distributed to family members and relatives. As suitable areas for such development become more limited, alternative types of housing, such as cluster designs and innovative apartment or multi-story structures, must be explored.

Policy

The government shall encourage efficient design of residential areas, restrict such development in areas highly susceptible to natural and man-made hazards, and recognize the limitations of the island's resources to support historical patterns of residential development.

G. Transportation

. Expansion of major transportation facilities poses a threat to certain beach areas and the primary aquifer.

Alternative means of transporation to the automobile, suc as public bus lines, do not exist on Guam. The use of a bicycle is difficult and dangerous due to lack of bicycle lanes on major roads, erratic driving patterns of the car oriented population, and generally poor conditions of roa shoulders. These conditions have resulted in the use of private motor vehicles as the sole means of transportatio With approximately 60,000 registered vehicles and a popul tion of over 105,000 the present highway and road systems are rapidly reaching their capacity levels. Location of the Naval Air Station and the Guam International Air Term on the north central plateau inhibits development of possible alternative major transportation routes or use c existing routes through the area. The lack of alternate forces major expansion of Marine Drive adjacent to shorel areas of Tamuning, Agana and Anigua. Certain connector roads have been proposed through the center of a major aquifer.

Policy

The Territory shall encourage the development of a safe, efficient and balanced transportation system to encourage alternate modes of transportation for the people of Guam while limiting negative impacts on the primary aquifer, beaches, estuaries and other coastal resources.

H. Erosion and Siltation

. Onshore construction practices in areas of overburden, steep slopes and sinkholes have created serious erosion problems

Development in areas having a substrate of unconsolidated weathered volcanics have caused extensive erosion and subsequent siltation of certain reef flats, particularly in the Piti Bay area. Project designers often do not consider erosion as a constraint to development and thus propose grading and clearing for construction on clay-covered slopes, sometimes with grades in excess of fifty percent. The practice of burning grasslands, primarily in Southern Guam, accelerates the erosion problem by removing the ground cover on these clay slopes. Other development occurs in areas adjacent to sinkholes. The resultant change in drainage patterns eventually silts-in the sinks creating a potential flood hazard for surrounding development and causing a loss of aquifer recharge.

Policy

Development shall be limited in areas of 15% or greater slope by requiring strict compliance with erosion, sedimentation, and land-use districting guidelines, as well as other related land-use standards for such areas.

3. Recommended Resource Policies

A. Air Quality

The large number of motor vehicles, the main solid waste disposal site at Ordot, electrical generating plants, a petroleum refinery, and high number of air installation takeoffs and landings contribute to Guam's air pollution.

Despite the above problems, the air quality on Guam is generally high due to fairly constant trade winds and locatic of energy-related facilities on the leeward side of the island. Guam's relatively high ambient air quality can be

maintained in accordance with Federal and local standards if the effect of the tradewinds is considered. Burning of high-sulphur fuel in the electrical generating plants, while inappropriate on the mainland, may be less undesirat on Guam due to this wind factor. Airborne particulate levels, especially dust from construction activities and seasonally from wildland fires, do, at times, exceed recommended levels.

Policy

All activities and uses shall comply with all local air pollution regulations and all appropriate Federal air quality standards in order to ensure the maintenance of Guam's relatively high air qualit

B. Water Quality

The high overall quality of Guam's coastal waters is being threatened by polluting discharges from various sources. The island's major aquifer in Northern Guam could be pollu from uncontrolled development, lack of functioning sewers extensive use of pesticides and herbicides. Saltwater intrusion is evident in some drinking water wells.

Point source pollution from sewer outfalls, storm drains, and septic tanks has created serious pollution problems in Pago Bay, Sleepy Lagoon, Agana River, East Agana Bay, Tumon Bay, Ylig River, Geus River and others. Stormwater runoff from heavily developed urban areas adjacent to the shoreline contributes greatly to general water quality deterioration. Although presently in excellent condition, the northern aquifer is increasingly under development pressure as a result of its proximity to major island

population centers and its suitability for development. If proper controls are not implemented, the aquifer could become polluted. Saltwater intrusion is evident in some drinking water wells and may be a result of excessive pumping.

Culturally Guam's people have used the reef flats of Guam as a major source of protein for generations. The net fishing and spear fishing also take on the air of a social function. This fishery, so important to the island lifestyle can easily be polluted and potentially destroyed by siltation from uncontrolled grading and by stormwater runoff borne pollutants from urban areas.

Policy

Safe drinking water shall be assured and aquatic recreation and reef fishing sites shall be protected through the regulation of uses and discharges that pose a pollution threat to Guam's waters, particulary in estuarine, reef and aquifer areas.

C. Fragile Areas

Development within unique terrestrial ecologic communities has seriously threatened certain unique animal and plant life.

Residential, commercial, and industrial activities often fail to develop in a manner complimentary to the characterist of the terrain. Wetlands, clifflines, ravine forests and historic and archaeologic sites are increasingly being threatened by development. Once developed, these fragile resources are lost for our and all future generations forever

Programs for the protection of unique marine habitats are badly needed. Guam's coral reef-associated marine resour are outstanding. Effects from thermal effluents, sewage runoff pollutants, sedimentation and development activiti mandate development of programs through which the most spectacular or threatened reef areas can be protected. Appropriate areas would include Cocos Lagoon and barrier Anae Island Patch Reef, Luminao Barrier Reef, Double Reef Haputo Reef, Uruno Point, Tarague/Scout Beach (Military), others. Though less spectacular, parts of Tumon Bay's re system could also be protected for tourist oriented recreational uses and subsistence reef fishing.

Policy

Development in the following types of fragile areas should be regulated to protect their unique character: historic and archaeol sites, wildlife habitats, pristine marine and terrestrial communiti limestone forests, and mangrove stands and other wetlands.

D. Living Marine Resources

Guam's commercial fishing industry has not been developed to its full potential. Illegal methods of reef fishing continue to seriously damage reef corals and fish populat

To date, no comprehensive program has been developed for exploitation of Guam's fisheries resources. Attempts at coordinated harvesting and marketing of local fish catche have occurred only recently through efforts of the Guam Fisherman's Cooperative. The Guam Marine Fisheries Advis Council, established under Executive Order 79-6, has begu formulating a Fisheries Management and Development Plan,

however, and interest in GovGuam and the private sector is strong. Without effective management programs, overharvestir of certain species and underutilization of others will contir

Policy

Living resources within the territorial waters of Guam, particularly corals and fish, shall be protected from overharvesting and, in the case of marine mammals, from any taking whatsoever.

E. Visual Quality

The scenic quality of the shoreline, particularly the ocean view from coastal roads, is rapidly deteriorating in develope areas. This becomes even more of a detriment to Guam considering that tourism is a major industry here and tourists pay for attractive scenery.

Economic conditions over the last five years and frequent natural disasters are responsible, to a great degree, for increasing numbers of dilapidated or abandoned structures. Inadequate enforcement of zoning, sign and subdivision laws also result in general degradation of the Territory's scenic qualities. General public apathy toward refuse disposal and associated practices, despite intensive public education efforts by certain government agencies and private groups, has led to proliferation of park and beach littering, abandoment of junk vehicles and illegal dumping. Inadequate funding in the area of park maintenance further compounds the problem.

Policy

Preservation and enhancement of, and respect for the island's scenic resources shall be encouraged through increased enforcement of and compliance with sign, litter, zoning, subdivision, building and related land-use laws; visually objectionable uses shall be located to the maximum extent practicable so as not to degrade views from scenic overlooks, highways, and trails.

F. Recreation Areas

Parks, conservation areas, wildlife refuges and open-spac public lands often lack basic amenities. Some communitie residential areas lack adequate sports facilities. Park beach support facilities are poorly maintained or lacking altogether.

Sufficient land area is available for coastal and inland parks, wildlife refuges, scenic overlooks and hiking area Use of these resources is hampered, however, by limited access in terms of developed and maintained roads, paths trails, inadequate support facilities, and lack of detail locational information. A majority of citizens have indi that insufficient facilities are available within village community centers for basketball, tennis, volleyball, and softball. Although government funds are continually bein appropriated for recreational facilities, actual acquisit planning, construction, and/or improvement is often a lengthy process. Funding for continuous maintenance is a persistent problem for both passive and active recreation facilities. A more extensive and better maintained park system is needed which includes marine areas as well.

Policy

Development of varied types of recreation facilities shall be located and maintained to be compatible with the surrounding environment and land uses; adequately serve community centers and urban areas and protect beaches and such passive recreational areas as wildlife and marine conservation areas, scenic overlooks, parks, and historic sites.

G. Public Access

- Increasing development along Guam's shoreline restricts access to the beaches and reefs.

  Access to certain beach and reef areas, particularly along the urban waterfront areas, is becoming increasingly restricted or impeded by strip commercial development. In other areas, private residents restrict access to beaches from the main highway through posting of signs alleging "ownership" of the beach. However, access is usually attainable from adjacent beach areas, approaching along the shoreline itself. Improvement of trails to certain bays and beaches and government land has enhanced accessability in these areas.

- Access to many recreational and scenic resources is restricted due to their location on military bases.

  Prime recreational areas such as Tarague Beach, Fena Reservoir, Haputo Beach, and Ritidian Beach are not freely accessible to the general public due to their location on military land. Agreements should be sought with the respective military commands to ensure more open access to these areas, while maintaining requisite levels of base security and cleanliness.

- Access to beach areas would enhance tourism attractions, as well as provide for local recreational opportunities.

Policy

The public's right of unrestricted access shall be ensured to all non-federally owned beach areas and all territorial recreation areas, parks, scenic overlooks, designated conservation areas and their public lands; and agreements shall be encouraged with the owners of private and federal property for the provision of reasonable access, to and use of, resources of public nature located on such land.

H. Agricultural Lands

Development of prime agricultural lands for other than agricultural use reduces the possibility of agricultural self-sufficiency on Guam.

While not a major problem given the number of other impediments to rapid agricultural growth, imprudent development can jeopardize Guam's potentially valuable agricultural resources. Existing practices, such as agricultural and parental subdivisic allow division of agricultural lands into unimproved lots as small as 2,500 square feet. These practices can pose a serious threat to these resources in the future. Those agricultural lands identified on the Land-Use Districting Map should be preserved solely for agricultural activities. As energy costs related to agricultural product importation rise, agriculture's role in maintaining a healthy economy on Guam will become more important.

Policy

Critical Agricultural lands shall be preserved and maintained for agricultural use.

## V. LAND-USE DISTRICTS

### A. Introduction

In order to implement the proposed Land Use Policies, it is necessary to classify lands on Guam based upon their existing physical characteristics and development potential.

This section describes the proposed distribution of projected use of the land area of Guam by utilizing the mechanism of land-use districting.

### B. Definition of Land-Use Districts

A land-use district is a land area identified by its development potential, existing characteristics, environmental restrictions or ecological complexity as being suitable for one of the four general types of use: Urban, Rural, Agricultural, or Conservation. District definitions encourage optimal land use in order to accommodate the growth that Guam will experience in the coming years.

#### 1. Urban

Urban districts are those areas characterized by and designated for higher concentrations of people, structures and streets, and located in proximity to basic services such as sewers, water, sanitation, police and fire protection, power and other major facilities and areas of high intensity use. For the most part, these urban districts reflect areas where this type of growth has occurred traditionally where appropriate and where it is projected as the best use for accommodating future growth.

#### 2. Rural

Rural districts are those areas composed of small farms mixed with low-density residential lots where urban-like concentrations of

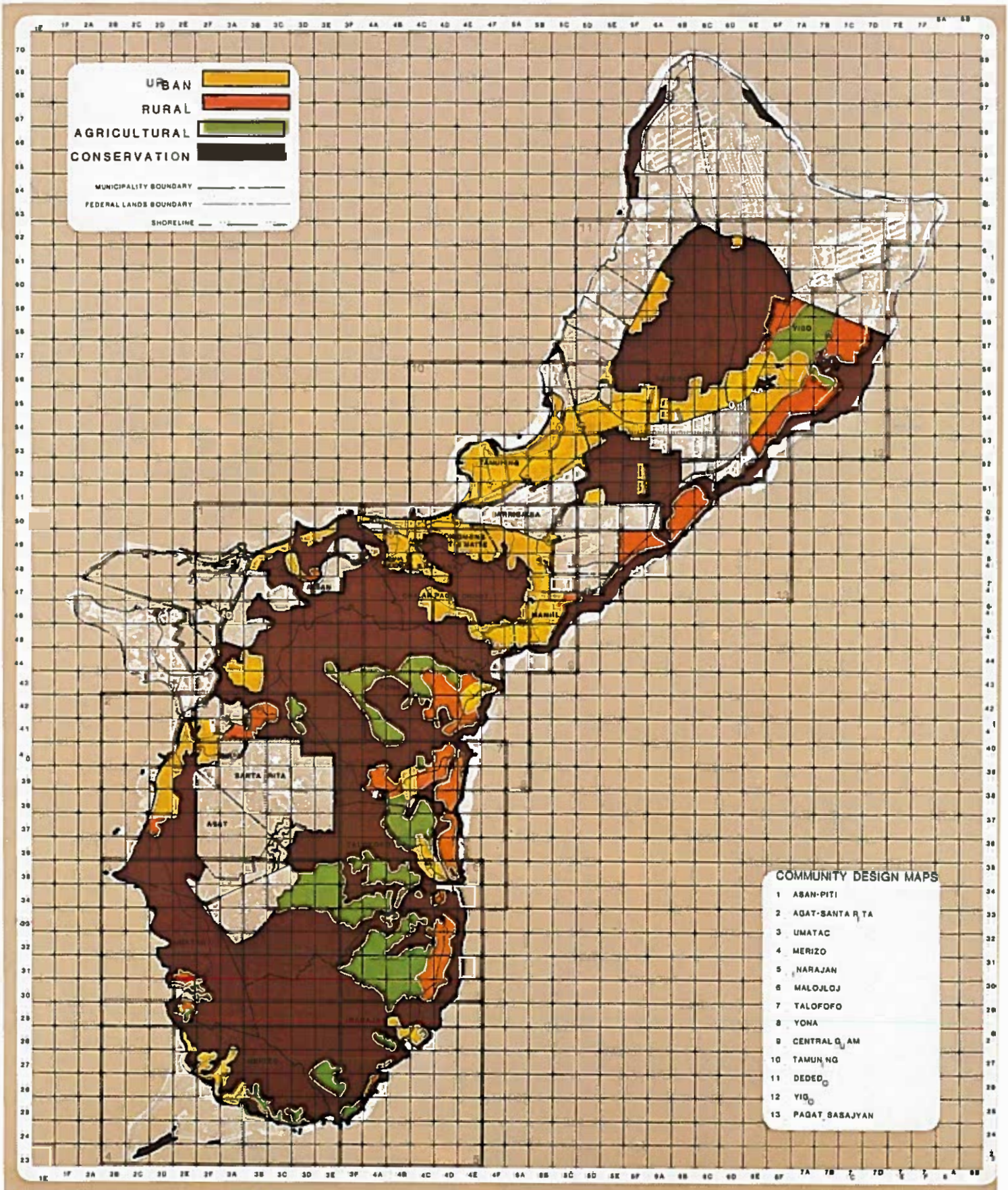
people, structures, streets and levels of services are absent. Rural districts may include those areas determined to be capable of adequately supporting services and population densities characteristic of urban districts in the future, but which are currently rural in character.

3. Agriculture

Agriculture districts are those areas characterized by the cultivati of crops, orchards, forage and forestry; farming activities, aquaculture or uses related to animal husbandry; services and uses clearly accessory to the above activities including, but not limited to, living quarters or dwellings, storage facilities, processing facilities and roadside stands for the sale of products grown on the premises; and open recreation facilities.

4. Conservation

Conservation districts include those areas necessary for protection of watershed and water sources, prevention of floods and soil erosion and preservation of archaelogical, historic, scenic, and other natural and cultural resources; parklands, wetlands, beach and wilderness areas; areas necessary for conservation of endemic plants and animals, open-space areas which, because of their present use, natural condition or openness enhance the present or potential value of abutting or surrounding communities; areas of value for existing or future recreational purposes; agricultural preserves as defined under Section 12603 of the Government Code; and other permissible uses and activities found not to be detrimenta to conservation policies and objectives. Conservation districts also contain a number of areas compatible with other use designatior but not appropriate for development at this time.




BUREAU OF PLANNING

NORTH

GUAM Land Use Districting Map

C. BOUNDARY ISSUES

1. District Boundary Revision

Petitions for District Boundary changes may be submitted at any time to the Territorial Planning Commission. These must contain written information identifying areas proposed for boundary changes, the proposed new District designation, documentation supporting the need for a revision, including an environmental impact assessment where agricultural or conservation districts are involved, and an area map showing affected boundaries, scale, adjacent uses and zoning. District boundary revisions must also be heard by the Subdivision and Development Review Committee and written comments filed by member agencies as is now the required practice for Subdivision and Zone change cases.

2. Review and Amendment

The Land-Use Districting Plan is not meant to be a static document. This is intended as the initial land use districting and will be re-studied and amended, where necessary. During this review, appropriate other governmental agencies will be consulted regarding changes in need, use, or intensity of development pressures since the plan was last reviewed. The resulting amended version will then be taken out for public review and comment. The comments gathered at these reviews will be evaluated and where appropriate incorporated into the final version that will be presented to the Governor and Legislature for adoption.

## VI. CONTINUING PLANNING PROCESS

The dynamic nature of the world and its related pressures on land use make it impossible to draft a plan that sees unerringly into the future. With this in mind, land use plans shall be restudied and adjusted where needed. This will keep the plans responsive to the changing pressures placed upon them as changes in economic, social, environmental, and demographic needs are felt. Specific plans shall be prepared for each village on Guam. These plans shall be known as Community Design Plans and will be able, because of their more detailed nature, to deal with individual community problems such as more specific transportation, housing, and commercial needs.

None of these land use plans seek to hinder or encourage growth. They are a tool to guide the inevitable growth into areas where it will best enhance the efficient functioning of the island's communities for the good of all while creating a more pleasing human environment for this and future generations.

# APPENDIX

## I. RESPONDING LOCAL AND FEDERAL GOVERNMENT AGENCIES

The following is a list of all local and federal government agencies that have submitted written comments on the Plan.

Office of the Attorney General
Department of Land Management
Department of Agriculture
Department of Commerce
Department of Labor
Guam Energy Office
Public Utilities Agency
Environmental Protection Agency
Department of Public Safety
Guam Airport Authority
Guam Power Authority
Guam Mass Transit Authority
Department of Youth Affairs
Department of Public Safety
Department of Corrections
Department of Public Health and Social Services
Guam Criminal Justice Planning Agency
Guam Health Planning and Development Agency
Small Business Administration
Veterans Affairs Office
Guam Community College
U.S. Department of the Interior, National Park Service
U.S. Department of the Interior, Geological Survey
U.S. Coast Guard
U.S. Army Corps of Engineers
U.S. Department of the Air Force

Typographical errors, omissions, misspellings and minor grammatical errors were corrected in the text of the Plan. Comments requiring a revision or response for clarification are presented below according to agency.

DEPARTMENT OF COMMERCE

1. With regard to the Shore Area Development Policy, "aesthetic and environmental quality" is subjective and requires criteria for effective implementation. (Page 21)

   Response: The Plan is a general one and, as such, does not intend to create hard parameters. The policy is included to provide the Territorial Planning Commission with latitude in their review of zone changes and land-use variances.

2. With respect to the Hazardous Areas Development Policy, the same concern as above applies to "unreasonable risks". (Page 22)

   Response: Again, the decision-making body is left the assessment of risk involved in the permits that they grant.

3. "Agricultural lands shall be preserved and maintained for agricultural use." The policy has many implications and may lead to property owners suing (the government). Not all land in agricultural use should necessarily remain for that use. (Page 23)

   Response: The policy should read "Critical agricultural lands ...." which expresses the intent more accurately.

4. It may not be sound economic policy to preserve land for agricultural use when greater economic benefits, long and short term, may be provided by an alternate use. (Page 29)

   Response: This will be considered by the Territorial Planning Commission when development is proposed. The burden of proof as to whether the benefits outweigh the resource loss shall rest with the developer. Sufficient acreage has been designated in urban and rural districts for Guam's population to the Year 2000.

5. Why should "traditional village and small scale farming activities be permitted to continue in certain areas?" Although we agree this is subjective, some objective reasoning and criteria would be helpful.

   Response: Sufficient land was districted urban for Guam's population projected to the year 2000. Unless an immense development crisis develops, we see no reason why Guam's traditional lifestyle cannot be maintained. Our public trust as planners demands that we provide for all of the people.

6. The definition of agriculture districts on page 48 mentions that aquaculture is one of the major permitted activities. However, on page 28 in the discussion on "Agricultural Support" it is stated that "Agricultural land, however, is kept at a buffered distance from major surface drainage, rivers..." This eliminates the prime land available to aquaculture development and therefore puts an unacceptable restriction on aquaculture development into a major industry on Guam. On the map provided the most likely areas for aquaculture development, Talofofo and Inarajan River valleys, are designated as conservation land. A provision to allow aquaculture use in these prime locations must be emphasized. The study entitled "Aquaculture and its Potential Environmental Impact on Guam's Coastal Water", which was done for the Bureau of Planning, designates land sites for aquaculture use.

   Response: A buffer, as stated above, is only a space of sufficient width that the rivers and major drainage is not polluted. This does not eliminate aquaculture; it allows for more careful review at the site-design stage. The Conservation designation does not preclude aquaculture or agriculture. It recognizes the need to protect Guam's fresh water and gives the T.P.C. the control needed to keep our water free from pesticides, siltation, and animal waste. With proper review and control, these uses could be permitted in conservation areas.

GUAM POWER AUTHORITY

7. Guam Power Authority has been seeking exemption from the Clean Air Act to permit burning of black oil and to burn only low sulphur fuel when the wind direction changes. GPA has submitted testimonies before the U.S. Congress justifying our position. We cannot have as our local policy full compliance with federal air quality standards when we are seeking exemption from it.

   Response: The discussion of the Air Quality Resource policy on pages 39-40 addresses this concern in part. As stated, the policy would require compliance with "local air pollution regulations and all appropriate federal air quality standards." If the burning of high sulfur fuel is acceptable, it would not be inconsistent with local policy.

8. There is no question that our drinking water must be protected. However, aquatic recreation and reef fishing sites should not be protected in the same manner as our drinking water. (Page 23)

   Response: Recommended policies for protection of both drinking water and recreational waters are general policy statements expressing the need and commitment for protection of water quality for specific uses. Standards and regulations, on the other hand, set specific allowable limits of pollutants in waters designated for different purposes.

9. Policies on Visual Quality, Shore Development, Recreation Areas and Public Access require some clarification. GPA poles are sometimes viewed as questionable when located along the seaside. In the absence of rights-of-way on the opposite side of the street, we are compelled to continue and preserve our existing lines and rights-of-ways. Difficulties might be encountered by GPA in the future when we seek to convert from the present wooden poles to concrete poles. Objections might then be raised against the permanent installation of our poles; however, at this time, or until some new allowance along the roadway is provided on the opposite side of the street and away from the shore view, we can see no alternative but to continue with maintaining and improving our lines where they are located today.

   Response: Again, the Plan is a general one. The various policies recommended are guidelines to the Territorial Planning Commission for use in their decision-making regarding development.

GUAM MASS TRANSIT AUTHORITY

10. With ongoing and future development occurring on Guam, it becomes essential not only to emphasize organized patterns of development to preserve limited available land, but also in that course, to emphasize or ensure that development occurs in close proximity to existing transportation facilities such as the highway network.

    Response: The urban development policy recommends, in part, that uses requiring high levels of support facilities should be concentrated within designated urban districts. Transportation facilities were considered in the designation of urban districts.

11. "Although proposed highway construction and re-construction projects are planned to accommodate expected increase (of traffic), the limited percentage of developable land on Guam combined with the planning phenomena that continued highway construction and highway widening projects will only serve to provide added room for more automobiles and increased auto population on Guam, are serious situations that need to be addressed."

    Response: We do not feel that continued highway construction will only serve "to provide added room" for more automobiles on Guam. An increased auto population will occur regardless of any planning whatsoever. We agree that competing demands, including the need for highway facilities, on our limited land resources are serious issues.

DEPARTMENT OF EDUCATION

12. In addition to the recommended policies indicated for each area described in the land use plan, strict fines should be imposed on those deviating from stated guidelines.

    Response: As written, the policies are general statements expressing the need for protection of our air, land and water resources. The enforcement of regulations that lend support to the various policies rests with various enforcement agencies.

13. With regard to the recommended Governmental Processes Policy on page 21, improved coordination can be insured through designation of a liaison from each government agency.

Response: A significant amount of inter-agency coordination is afforded through meetings of the Subdivision and Development Review Committee, although we agree there is room for improvement in this area. An advisory council for the Guam Coastal Management Program is under consideration at this time.

DEPARTMENT OF TRANSPORTATION

14. Numerous large and small farms exist along the Y-Sengsong Road in Dededo. If these farms are to continue to operate, the highway needs of this area will be somewhat different than if the area is restricted to conservation uses.

Response: The plan designates the Y-Sengsong area for conservation use as it lies above the northern aquifer which provides 70% of the island's potable water. The area most of which is government land leased to farmers, is served by coral based roads. Development and expansion of highway facilities at this time is unacceptable as it would encourage further development and increase contamination of the water lens.

DEPARTMENT OF LABOR

15. Additional effort should be made in utilizing released federal land in Apra Harbor for light industrial development.

Response: The Port Authority is currently developing a master plan for the harbor area, much of which is being considered for light industrial use.

PUBLIC UTILITY AGENCY OF GUAM

16. We suggest that a specific development policy address the protection of the northern aquifer.

Response: Various government agencies are currently coordinating with Barrett, Harris and Associates, Inc. in their preparation of the Northern Guam Lens Study. As more specific information is available it will be incorporated into the map and policies of the Land Use Districting Plan.

GUAM AIRPORT AUTHORITY

17. The Plan does not explain how previously approved projects now in conflict with the Plan will be resolved.

Response: Adoption of the Land Use Districting Plan will not prohibit projects previously approved by the Territorial Planning Commission if all conditions are met.

## II. DISTRICT MEETING CONCERNS

1. Will the adoption of the Plan affect the existing zoning of properties?

   Response: The LUDP is not a zoning map and will not mandate that present uses change within a district. The designated districts and policies in the plan are intended to serve as general guidelines for the Territorial Planning Commission in their review of requests for zone changes and land-use variances.

2. Why is much of the island districted "Conservation"?

   Response: Conservation district designations are the result of various factors. Special management attention is required in certain areas for the prevention of flooding and soil erosion, protection of water sources and the preservation of archaeological, historic, scenic and cultural resources. Other areas are necessary for the conservation of endemic plans and animals. Open space areas because of their present use or natural condition, have also been districted "conservation" because they enhance present or potential value of surrounding communities. Conservation districts also include areas compatible with other use designations but are not appropriate for development at this time.

3. Why wasn't all land on Guam included in the Land-Use Districting Plan?

   Response: Presently a third of the island is under federal ownership and management, thus falling outside the jurisdiction of the local government. Efforts are underway by the local government to obtain federal lands not critical to military missions.

4. How will my property taxes be affected by this plan?

   Response: The plan will have no direct effect upon property taxes. According to the Department of Revenue and Taxation, the two factors affecting taxes are the value of the improvement on the property and the selling price of land in the neighborhood of the property.

5. The use of the word "shall" in the policy statements denotes powerful restrictions.

   Response: This was taken into consideration in the policy revisions.

6. What mechanisms exist that would allow a district change after the plan is adopted?

   Response: The plan will be reviewed every five (5) years at which time district change requests will be considered. In addition, requests can be submitted to the Territorial Planning Commission for their consideration prior to the 5-year review period.

7. Why isn't a noise control policy included in the Plan?

   Response: A policy addressing noise control is under consideration at this time. The Guam Environmental Protection Agency is currently examining the island's noise pollution problems and efforts are underway to revise noise control standards and regulations.

8. How will the Plan affect agricultural leases on land districted for conservation?

   Response: As long as lease conditions are being met, existing leases will remain valid. Given that 70% of the island's potable water is derived from the northern aquifer, contamination of this resource must be prevented. More careful monitoring of these leased areas is to be expected.

9. Are there future plans to relocate the airport?

   Response: Proposals to relocate the airport have been made in the past, many of which have offered definite planning advantages. But until the Guam Airport Authority and military indicate that it is feasible and within the economic capabilities of our government, we felt it was more realistic to reflect the existing use on the districting map.

10. What effort was made to inform the public of the plan and district meetings?

    Response: The Plan was presented at meetings with the Commissioners Council. All commissioners were notified in writing and by phone prior to the public hearings in the villages and encouraged to notify village residents and the Municipal Planning Councils. Meeting notices were also published in the Pacific Daily News ten days and one day before each meeting.

11. Why is legislative approval being sought?

    Response: Public Law 12-200, as amended, mandates that upon approval of the plan by the Governor, it be sent to the legislature for adoption by resolution. Recognition of the plan by both the executive and legislative branches of government is necessary for effective administration of the island's natural resource policies and programs.

12. Why are the beach areas designated as conservation areas?

    Response: Conservation districts allow more control of development by the Territorial Planning Commission. Public access, aesthetics, setback requirements, pollution control and other such factors should be thoroughly reviewed by the commission before allowing development that may permanently degrade our shoreline. Considering the importance of tourism to our economy, Guam cannot afford to have development that would detract from this resource.

13. The terms "urban", "rural", "conservation", and "agriculture" imply that only a certain use is permitted within each district. Why weren't less confusing terms used for district designations?

Response: Although we recognize this concern, the definitions in the text should assure an understanding of what is intended by the terms.

The following are comments regarding boundaries and specific district designations.

1. Merizo

   Comment: All of Merizo should be districted for rural use.

   Response: Portions of Merizo are designated urban to reflect existing population density and the need for infrastructure. Districted for this use is the area inland of Route 4, south towards the Pigua Subdivision and south to the northwestern bank of the Geus River. The remaining urban areas were changed to rural to reflect the low population density, the 1980 Census indication of moderate development and the desire of the area's residents.

2. Malojloj

   Comment: The Malojloj area between Pauliluk Bay and Talofofo should be designated for agricultural use rather than rural.

   Response: The existing population density and infrastructure suggests a rural rather than agricultural designation. However, agricultural use is compatible within rural district.

3. Agat

   Comment: Leased government land south of the Pagachao Subdivision should be designated for rural use rather than conservation.

   Response: The area includes property from the southern bank of the Talefac Creek, parallel to the shoreline south to the Territorial Seashore Park and east along the park boundary to Route 2. Low density residential use and moderate agricultural activities in this area render it more appropriate as a rural district. The area within the Territorial Seashore Park boundary was left as conservation, reflecting Executive Order 78-42 which created the park.

4. Dededo

   Comment: The area south of Dededo, west of Andersen Air Force Base Marbo Annex and north of the Barrigada Communication Station should be redesignated for rural use.

   Response: The subject area was redistricted for rural use. The revision is appropriate as the existing use of the area is low density residential and moderate agricultural use. However, the 140' high cliff at the Latte Heights Estates boundary should remain districted conservation.

5. Yigo

Comment: The sinkhole north of the Yigo Commissioner's Office should be redistricted for agricultural use.

Response: Sinkholes facilitate rapid injection of water into the aquifer system. These areas are particularly critical in terms of pollution of our underground freshwater resources as even partial filtration does not occur. These areas must remain districted conservation so that any proposed uses over these important recharge areas are carefully reviewed by the Territorial Planning Commission.

Comment: The urban area north of Marianas Terrace, Yigo should be redistricted for agricultural use.

Response: The area was redistricted agriculture to reflect the existing use. The property was identified as that general area north of Yigo Elementary School, from the Salas Subdivision along the northeastern boundary of the sinkhole, the northeastern boundary of Marianas Terrace, along the existing residential development on Gayinero Road and Route 15.

Comment: The urban area around Perez Acres in Yigo should be redistricted agriculture.

Response: The property was identified as that general area from the eastern boundary of AAFB Marbo Annex at a point in line with the southern boundary of Perez Acres, east toward Takano's subdivision and southeast toward Route 15. The rural designation appropriately reflects the existing uses of the area and the potential for future development.