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

Hazard Prone Areas

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

Guam is at substantial risk from earthquake hazards. As to be expected in an island setting, these risks include inundation of low-lying coastal areas by sea waves and liquefaction of sandy materials in areas of high water table, in addition to ground shaking. Of particular concern are steeply sloped hillsides, which are particularly susceptible to earthquake-induced land sliding. The rock is often fractured and weathered, which leads to increased hazard with time and rainfall. Slumping has occurred in some areas. Many slopes that have failed during previous heavy rains are also likely to fail in the event of a major earthquake.
The other critical areas are waterfront locations situated on loose alluvial soils or man-made fill. The performance of such materials in an earthquake are notoriously poor. The water soaked soils tend to amplify even weak ground motions, and they liquefy easily. The result is an increased susceptibility to damage in these areas.

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

Floodplains and Floodways

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

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

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

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

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

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

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

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

- Conservation and Management - Floodplains require careful management to prevent damage that results from floods and to preserve their value as scenic, recreational, and agricultural resources. Floodplains provide significant areas of open space, serve as scenic buffers between incompatible land uses, and provide prime agricultural opportunities. To protect vegetation along natural streams and other water resources, preserve aesthetic values, and to prevent erosion and siltation problems, performance standards should be put into effect for development in these areas.

- Development - Only low-intensity activities that do not obstruct the flood flow should be allowed in the floodplain. Replacement of undersized culverts should be undertaken to relieve backwater flooding. No public or private construction should be permitted in a manner that will materially increase the degree of flooding.

- Flood Protection Elevation - The 100-year flood elevation increased by one foot is used for planning purposes as the flood protection elevation. The 100-year flood boundary encompasses lands that have at least a one in 100 chance of being inundated in any given year. Such boundaries are determined by Flood Insurance Rate Maps (FIRM), issued by the Federal Emergency Management Agency. These areas are, however, subject to change when development increases the magnitude and frequency of floods. In addition, the compilation of existing floodplain regulatory policies into a single floodplain protection performance standard should serve to better focus and regulate development within floodplains.

Steep Slopes

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

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

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

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

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

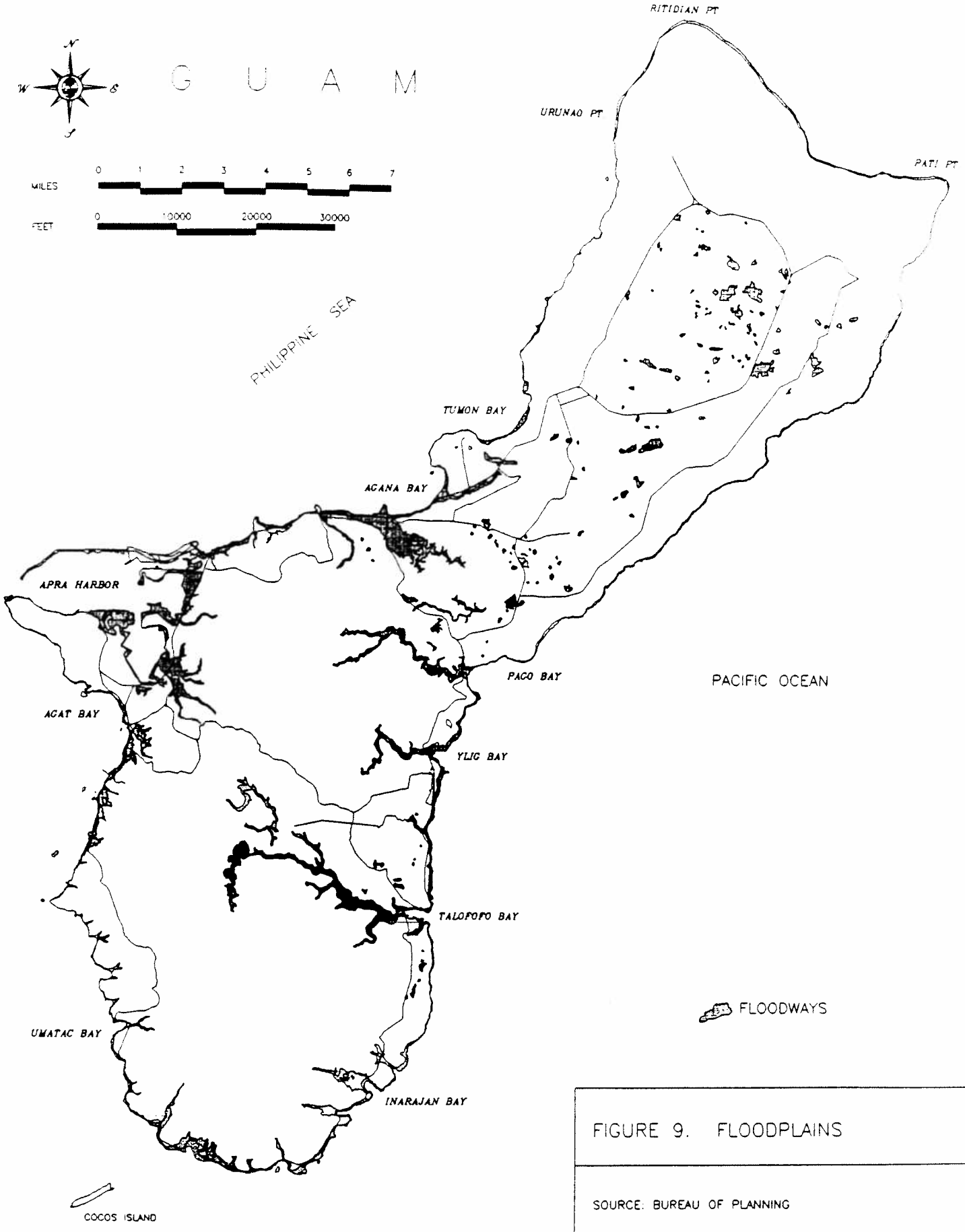

FIGURE 9. FLOODPLAINS

SOURCE: BUREAU OF PLANNING

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

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

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

Aquifer Recharge Areas

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

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

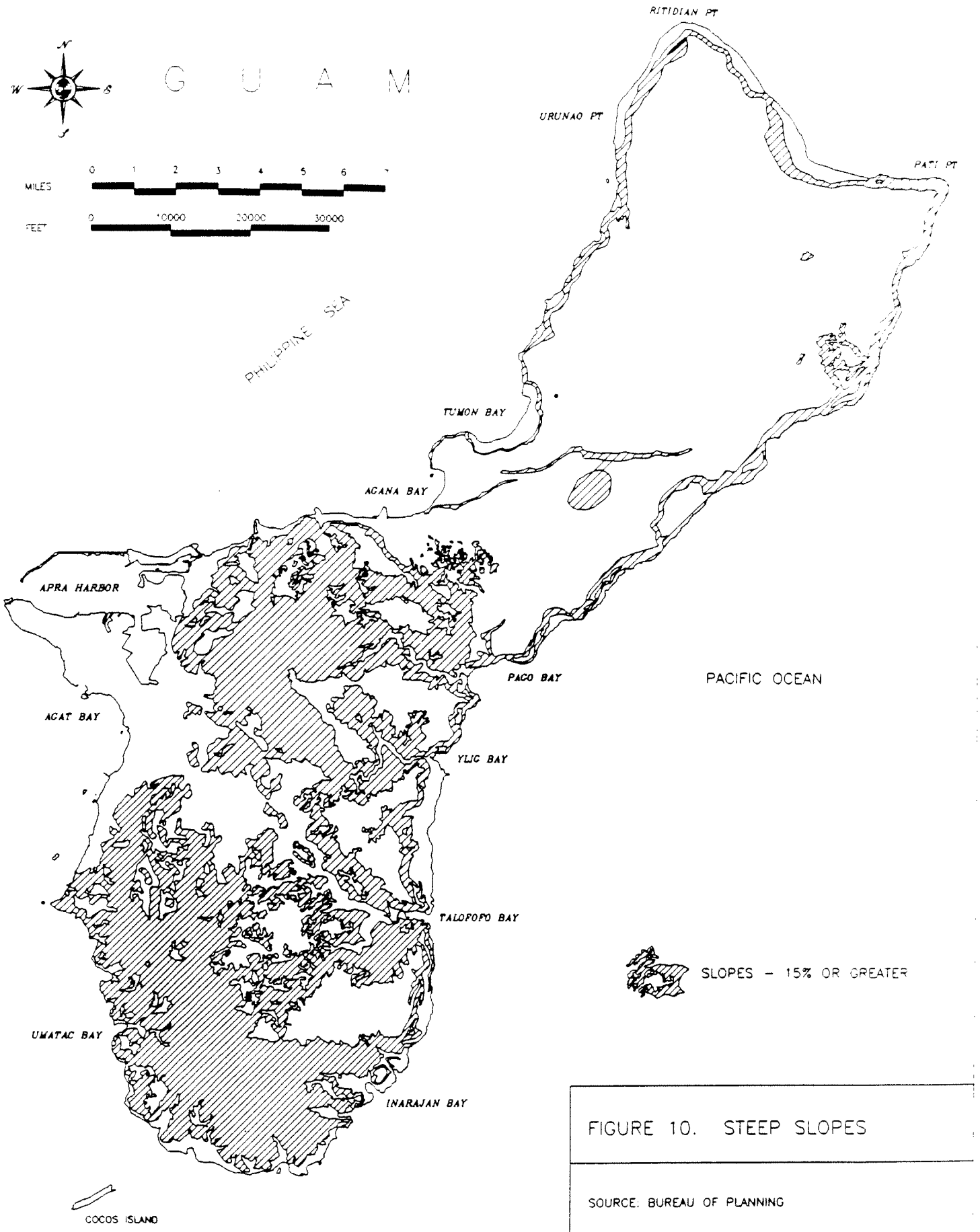

FIGURE 10. STEEP SLOPES

SOURCE: BUREAU OF PLANNING

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

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

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

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

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

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

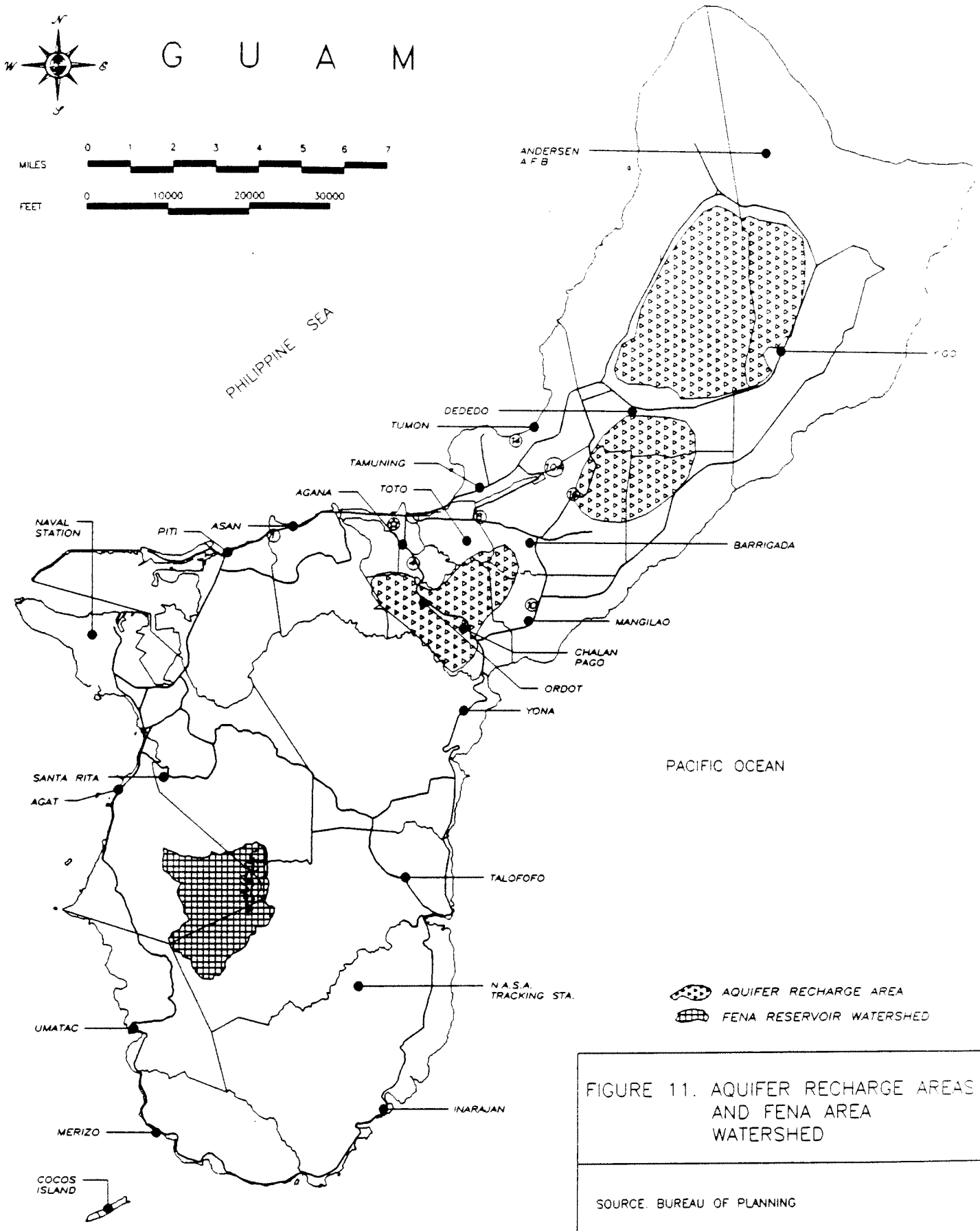

FIGURE 11. AQUIFER RECHARGE AREAS AND FENA AREA WATERSHED

SOURCE. BUREAU OF PLANNING

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

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

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

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

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

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

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

Reservoir Watershed Areas

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

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

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

Areas of Particular Concern

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

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

Terrestrial Critical Habitats

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

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

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

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

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

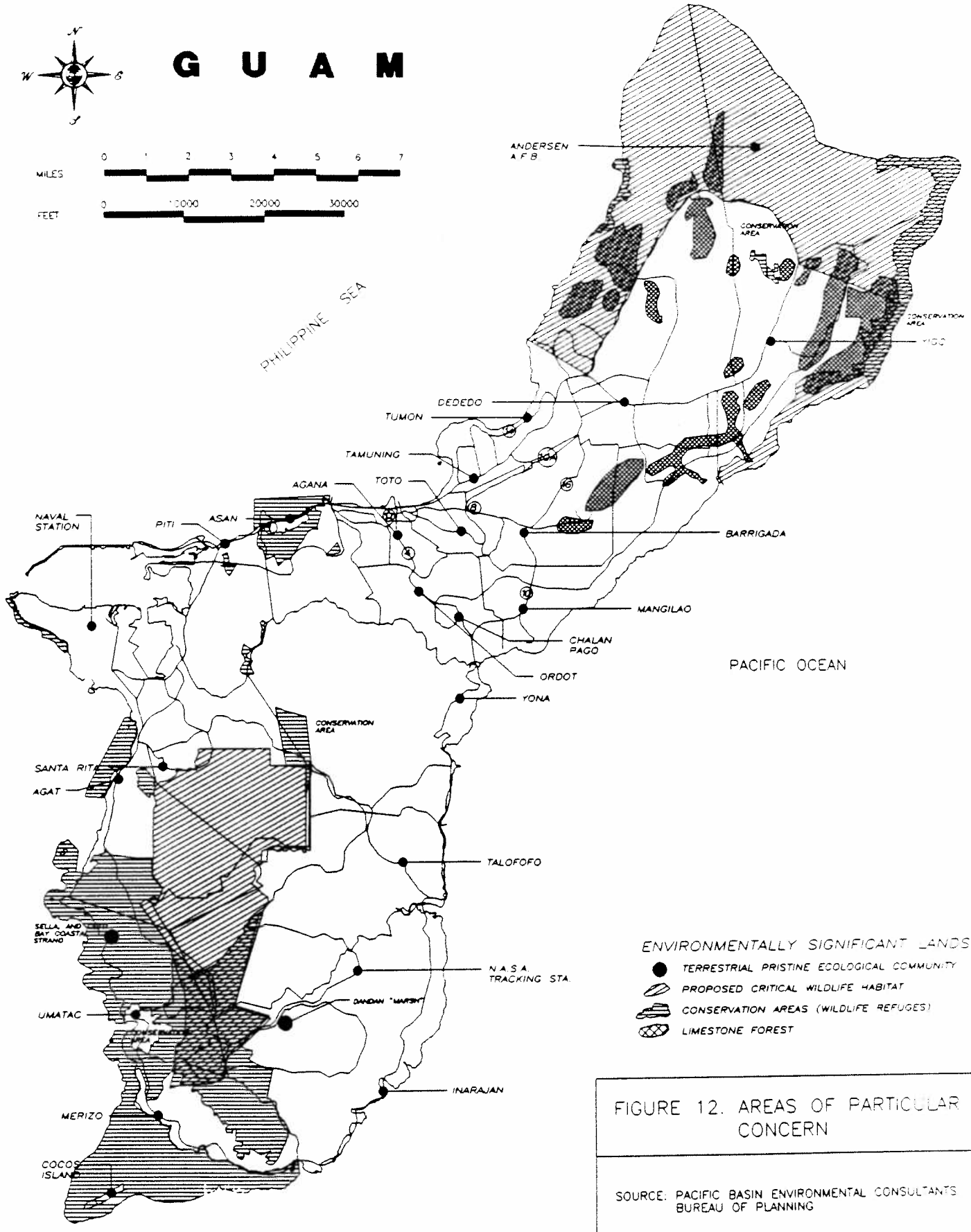

FIGURE 12. AREAS OF PARTICULAR CONCERN

SOURCE: PACIFIC BASIN ENVIRONMENTAL CONSULTANTS
BUREAU OF PLANNING

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

Conservation Areas

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

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

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

Terrestrial Pristine Ecological Communities

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

Seashore Reserve Zone

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

TABLE 7
TERRESTRIAL PRISTINE HABITAT

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

Sources: Bureau of Planning.
Pacific Basin Environmental Consultants

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

Limestone Forests

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

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

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

Natural Preserves/Conservation Reserves

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

TABLE 8
PROPOSED NATURAL PRESERVES

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

Source: Department of Parks and Recreation

TABLE 9
EXISTING NATURAL PRESERVES

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

Source: Department of Parks and Recreation

TABLE 10
PROPOSED CONSERVATION RESERVE

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

TABLE 11
EXISTING CONSERVATION RESERVES

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

Footnote: * Is already in Historic Site
Source: Department of Parks and Recreation

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

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

Source: Dept. of Parks and Recreation

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

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

Source: Dept. of Parks and Recreation

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

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

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

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

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

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

Prime Agricultural Lands

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

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

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

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

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

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

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

PUBLIC PARTICIPATION PROCESS

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

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

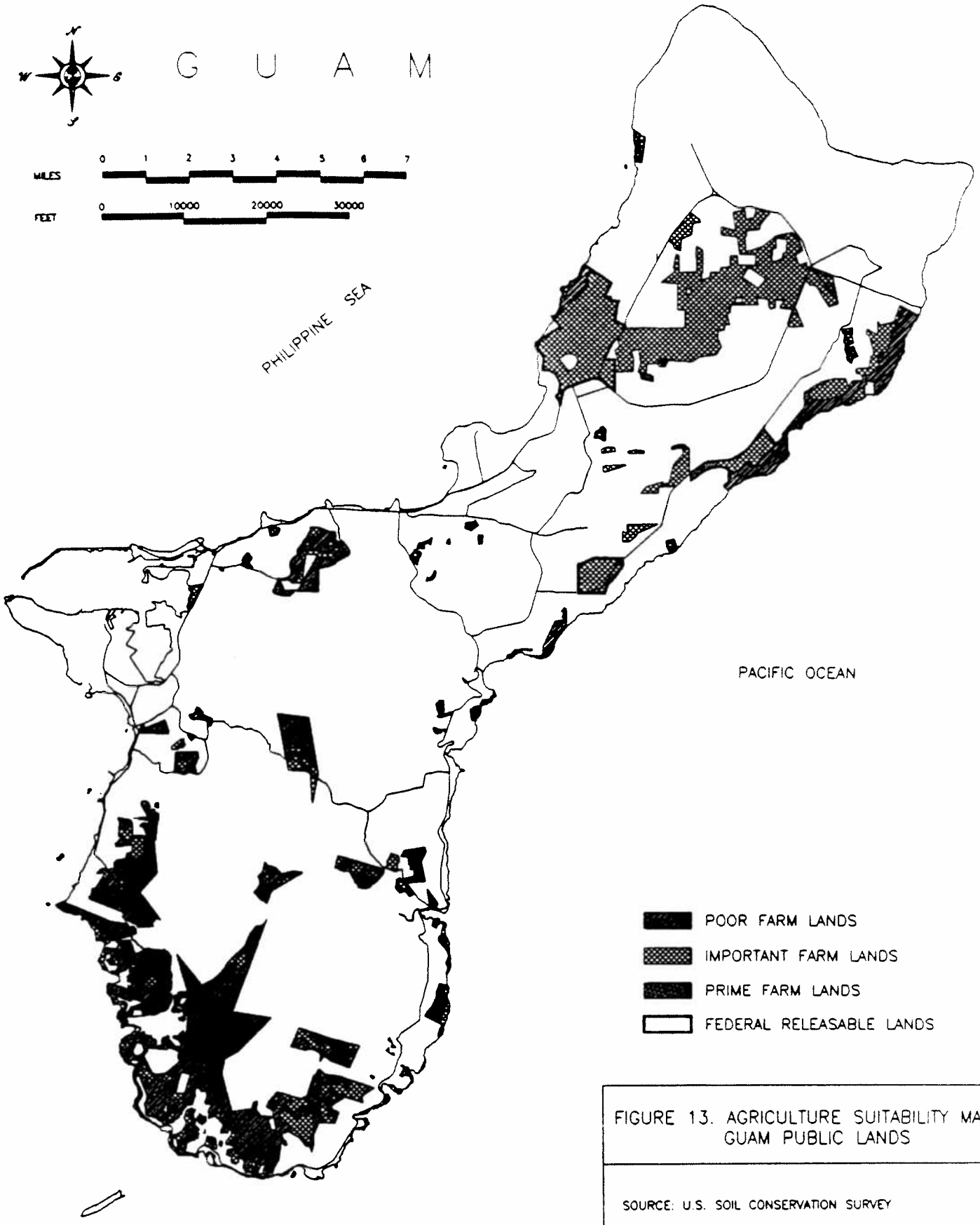

FIGURE 13. AGRICULTURE SUITABILITY MAP: GUAM PUBLIC LANDS

SOURCE: U.S. SOIL CONSERVATION SURVEY

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

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

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

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

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

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

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

Summary of First Series of Village Meetings

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

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

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

Significant Issues Discussed Island-wide

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

(1) Controlling new development by providing community input into the project approval process to maintain or improve island residents' quality of life and that of future generations;

(2) Providing adequate public facilities and services, such as schools, parks, roads, medical facilities, power, water, sewer, and solid waste disposal, to meet existing and future demands and requiring developers, as new projects are proposed and built, to pay their fair share of the necessary improvements;

(3) Providing affordable land and housing for island residents; and

(4) Preserving Guam's cultural heritage, unique natural resources and traditional way of life.

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

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

- Flood Control - Inadequate flood control, especially overflowing (or non-existent) storm drainage facilities along roadways, was a very significant issue in the southern villages, including Inarajan, Merizo, Talofofo, and Umatac, and in several of the central villages, particularly Agana, Agat, Barrigada, and Mongmong-Toto-Maite.

- Potable Water and Power - Potable water (water quality and its availability) and the provision of power were also significant issues, particularly in the southern villages where there are frequent shortages.

- Sewage Treatment - Sewage treatment facilities are lacking in much of the south and are inadequate in some of the more populated northern areas, including Mongmong-Toto-Maite and Tamuning-Tumon, where sewers and pump stations frequently overflow.

- Solid Waste - The issue of solid waste disposal was most significant in Chalan Pago-Ordot . The inappropriate location of the landfill (adjacent to residential areas) and its hazards to the village were that community's major problem.

- Schools - Overcrowded, inadequate schools are a problem throughout the island, especially in Dededo, Yigo, Yona, Inarajan, and Umatac.

- Medical Facilities - The lack of quick, easy accessibility to medical facilities, especially emergency medical service, is a major concern in the southern portion of the island. Residents there proposed locating a major medical facility in that area. Residents of Agat proposed a medical emergency helicopter service for the southern villages. The poor quality of service at the existing hospital in Tamuning was cited by residents of Tamuning-Tumon.

- Parks and Recreation - The lack of park and recreation facilities, especially for children and teenagers, was a major issue discussed at each village meeting.

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

- Developers should pay - An overwhelming majority of residents in all villages felt that developers should be required to pay for the costs of improving public facilities and services that their new project would impact.

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

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

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

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

Significant Issues Discussed at the Village Level

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

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

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

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

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

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

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

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

ALTERNATIVE CONCEPT PLANS

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

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

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

Vision I - Current Trends

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

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

Vision II - Public Input

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

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

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

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

Vision III - Growth Management

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

- **Creating "employment/housing centers"** - to establish the "critical mass" of land use intensities necessary to reduce the length of automobile trips and maximize the cost efficiency of public services (e.g. water, sewer, and mass transit);

- **Developing mixed-use projects** - (tourism-commercial-residential) to support the intensities necessary to implement a balance between jobs and housing (as well as to create stable community-based villages, reduce the land consumption rate, and provide more opportunities for affordable housing);

- **Allocating new growth** - to protect areas with environmental limitations and to expand non-tourism economic development opportunities (e.g., direct growth away from sensitive areas to reduce the opportunities for encroachment; reduce the threat to groundwater reserves in the north by shifting high water use intensive development, including golf courses, to central and south-central areas of the island where surface water supplies may be exploited more easily, and protect prime agricultural and potential maricultural areas); and

- **Capitalizing on the comparative strengths and weaknesses of both the public and private markets** - This approach assumes public incentives for public/private partnerships (e.g., affordable housing, infrastructure improvements, etc.) are more attractive to the private sector when the private sector has a direct stake in the venture.

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

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

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

A third minor tourism node is proposed for Agat to:

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

Second Series of Village Meetings

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

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

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

Vision 1 - "Current Trends" Public Response

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

The North

- Expand and improve roads and wastewater treatment facilities.

The Central East

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

The Southwest

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

The Southeast

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

The South

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

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

The North

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

The Southwest

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

The Southeast

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

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

Vision II - "Public Input" Public Response

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

The North

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

The Central West

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

The Central East

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

The Southwest

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

The Southeast

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

The South

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

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

The Southeast

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

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

Vision III - "Growth Management" Public Response

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

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

The North

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

The Central West

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

The Central East

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

The Southwest

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

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

The Southeast

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

The South

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

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

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

Summary

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

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

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

- The Southern Villages (Agat, Santa Rita, Merizo, Umatac, and Inarajan) should be allowed to preserve their traditional culture, while maintaining a stable population and economic base. Population growth will be held back by environmental and infrastructural limitations. There will be very limited hotel and tourist facilities in the South. Most growth will occur in Agat and Santa Rita with smaller-scale commercial activities promoted in this area.

- The Southwestern Villages (Asan-Maina and Piti) need economic input from the continued development of the Commercial Port. At the same time, more housing and small business stimulus is needed to provide families with better opportunities to stay in the villages, while still preserving their traditional ties to the oceanfront.

- The Southeastern Villages (Yona and Talofofo) will experience more rapid growth as golf courses and tourist-oriented facilities are built. Significant infrastructure improvements will be made to the region's roads, potable water, and wastewater treatment systems. The Manengon Leo Palace project will be the stimulus for the development of a new urban center in Yona. However, most growth will occur away from the traditional village core, and both Yona and Talofofo will retain their low density and small-scale commercial centers.

- The Central East Villages (Agana Heights, Sinajana, Barrigada, M-T-M, Mangilao, and Chalan-Pago Ordot) will also be the focus of significant growth pressure. The availability of roads, land, and other public infrastructure will draw development from the more urbanized areas of the island. Large-scale residential and commercial development will be attracted to the region, prompting the need for the control of roadside development.

- The Central West Villages (Agana, Tamuning, and Tumon) will continue to be the major hotel and commercial district on the island. Redevelopment efforts will be focused on creating more housing and other activities in downtown Agana, reflecting the increased interest in Agana's heritage. Tumon will remain the primary hotel and tourist district. Tamuning will remain as the primary commercial district.

- The Northern Villages (Dededo and Yigo) will continue to be the primary focus of new growth. However, the rate of growth should be timed to coincide with the efficient delivery of potable water, wastewater, and new highways, so as to maintain an adequate quality of life in the region. The future growth rate should be slowed so as to let the delivery of potable water, wastewater services, and new highways catchup and provide an adequate level of service to residents, as well as recognizing that protection of the groundwater lens has paramount importance. The development of golf courses, hotels, and other tourist facilities should be discouraged in the north.

IMPACTS OF GROWTH

Land Allocation

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

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

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

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

TABLE 14
1991 Land Use/Population Relationships

DENSITY	PERSONS PER ACRE
Residential (Low Density)	18
Residential (Med-High Density)	313
Commercial	191
Industrial/Warehousing	217

Source: WBF/SPG; Richard Rosario, 1991.

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

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

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

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

Impact Analysis

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

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

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

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

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

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

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

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

Potable Water Needs

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

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

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

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

Wastewater Collection and Treatment Needs

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

Solid Waste Needs

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

Transportation Needs

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

Public Safety/Health Care Needs

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

Recreation Needs

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

LAND USE PLAN

PREMISE

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

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

Performance Planning

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

INTENSITY DISTRICTS

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

A. INTENSITY DISTRICT 1: Parks

1. General Description of Character and Intent of District

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

2. Permitted Uses

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

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

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

- Sites for the preservation of prehistoric, historic and cultural resources, which shall be administered according to GCA Title 21, Chapter 76.
- Private Concessionaires

* The *Intensity District 1: Parks* designation within the authorized boundaries of the War in the Pacific National Historical Park are limited to those lands in public ownership. Lands within the National Park in private ownership shall be designated as *Intensity District 2: Low Intensity* until such time as they are acquired by the National Park Service. When such acquisition has been accomplished, these lands shall then be designated as Intensity District 1.

b. In delineating those areas designated as Intensity District 1 on the Land Use Plan Map(s), every effort was made to ensure that all of this land was owned by either the Government of Guam or the federal Government. If, in fact, there are privately-owned parcels that have been inadvertently designated as Intensity District 1, and if the property owner can produce legal instruments to show the Zoning Official that he/she owns lands that have been so designated, these lands shall be automatically re-zoned to Intensity District 2 and the Government shall revise the map(s) accordingly.

c. District 1 lands shall be administered in conformance with Title 21 GCA Chapter 77 - Parks and Recreation, and any adopted Conservation Master Plan for Guam.

3. *All of the above uses shall be permitted in Intensity District 1, provided that all of the standards for each use, as specified in the following Table of Dimensional and Density Requirements, and those Performance Standards that apply, have been observed. The Performance Standards that could apply include those on the following list. The Zoning Official maintains copies of these Performance Standards and a list of the Government of Guam agencies or departments administering each standard.*

   a. Off-Street Parking and Loading Standards
   b. Environmental Protection Standards
   c. Vegetation Protection Standards
   d. Sign Standards
   e. Historic and Cultural Conservation Standards
   f. Stormwater Management Standards
   g. Floodplain Protection Standards
   h. Wellfield/Groundwater Protection Standards
   i. Hillside Development Standards
   j. Supplemental Regulations

B. INTENSITY DISTRICT 2: Low Intensity

1. General Description of Character and Intent of District

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

2. Permitted Uses

a. Agriculture and Aquaculture

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

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

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

b. Dwellings

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

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

c. Bed & Breakfast Inns/Guest Houses

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

- Bed & Breakfast Inns
- Guest Houses

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

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

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