

**SANDY POINT  
AREA OF PARTICULAR CONCERN  
(APC)**

*A COMPREHENSIVE ANALYTIC STUDY*

V.I. DEPARTMENT OF PLANNING AND NATURAL RESOURCES  
*Coastal Zone Management Program*

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## LIST OF KEY ACRONYMS

Archaeological Resources Protection Act	ARPA
Area of Particular Concern	APC
Base Flood Elevation	BFE
Biological Oxygen Demand	BOD
Coastal Barriers Resource System	CBRS
Coastal Land & Water Use Plan	CLWUP
Coastal Zone Management Act	CZMA
Department of Housing, Parks and Recreation	DHPR
Department of Planning and Natural Resources	DPNR
Department of Public Works	DPW
Division of Archaeology & Historical Preservation	DAPH
Coastal Zone Management Program	CZMP
Division of Environmental Enforcement	DEE
Division of Environmental Protection	DEP
Division of Fish and Wildlife	DFW
Federal Emergency Management Agency	FEMA
Gallons Per Day	GPD
Hess Oil of the Virgin Islands Corp.	HOVIC
Mean High Water	MHW
Mean Low Water	MLW
Million Gallons Per Day	MGD
National Flood Insurance Program	NFIP
National Natural Landmark	NNL
National Park Service	NPS
National Wildlife Refuge	NWR
Nephelometric Turbidity Unit	NTU
Off Road Vehicle	ORV
Office Archaeological Sites	OAS
St. Croix Environmental Assoc.	SEA
Sea Level Rise	SLR
Sewage Treatment Plant	STP
Significant Natural Area	SNA
Territorial Pollutant Discharge Elimination System	TPDES
U.S. Army Corps of Engineers	USACOE
U.S. Department of Commerce	USDC
U.S. Environmental Protection Agency	USEPA
U.S. Fish and Wildlife Service	USFW
U.S. Geological Survey	USGS
University of the Virgin Islands	UVI
Water and Power Authority	WAPA
Water Quality Monitoring	WQM
Virgin Islands Rum Industries Ltd.	VIRIL

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## **1. INTRODUCTION**

### **1.1 General**

Sandy Point is one of 18 Areas of Particular Concern (APC's) designated by the Planning Office in 1979 after public nominations and comment had been received (Figure 1). It is a peninsula of approximately 500 acres located 3 km SSW of Frederiksted, at the southwest tip of St. Croix (Figure 2). Located within the APC is the Westend Salt Pond, the largest salt pond in the U.S. Virgin Islands. Also contained within the APC is the 398 acre Sandy Point National Wildlife Refuge (NWR). It is part of the Caribbean Island NWR Complex which provides habitat protection for migratory aquatic birds, and one of only three NWR's in the U.S. Virgin Islands.

The three-mile beach at Sandy Point is the longest stretch of beach in the Territory, within which is the largest (approximately 1.6 miles in length) and most important nesting site for the Leatherback sea turtle (*Dermochelys coriacea*) in the United States and Territories. With its broad profile and nearby deep water, the beach is a classic Leatherback nesting beach (Boulon, 1990). The Sandy Point beach is one of only thirteen significant nesting sites for the Leatherback worldwide (Sternberg, 1981 as cited in Dutton, *et al.*, 1992).

On July 26th, 1991, the CZM Commission adopted the 18 APC's recommended in the Final Environmental Impact Statement (USDOC, 1979), which accompanies the Virgin Islands CZM Act. The Final Environmental Impact Statement notes "the importance of the entire coastal zone", but declares that "certain areas are of yet greater significance." It also establishes the criteria for the designation of Areas of Particular Concern which are as follows:

- Significant Natural Areas
- Culturally Important Areas
- Recreation Areas
- Prime Industrial and Commercial Areas
- Developed Areas
- Hazard Areas
- Mineral Resource Areas

In September of 1991, the Coastal Zone Management (CZM) Commission met and held public hearings on all three islands on the boundaries for all 18 APC's. The Commission met again on October 1, 1991 and, based upon public input and staff recommendations, approved the boundaries of the APC's.

APC management requires knowledge of an area's historical development and traditional uses, and an action-oriented plan for the area's future utilization. This Comprehensive Analytic Study and proposed management plan is intended to serve as the overall planning and management framework within which the various regulatory entities carry out their respective decision-making authorities.

The APC planning effort recognizes that permit decision-making is most often reactive; that is, the decision to approve or disapprove a proposed development is made in response to a permit request, not in advance of it. The general goal of developing an APC management framework is to be able to make *a priori* decisions about the allowable extent of modification of an entire landscape unit. In

other words, to raise the level of decision-making from the site-specific to that of natural landscape units and the maintenance of a wide array of interactive resource uses.

## **1.2 Relationship to Other Plans and Regulations**

The Sandy Point APC Comprehensive Analytic Study and proposed management plan was prepared under the authority of the Coastal Zone Management Commission. The Study and proposed plan is intended to serve as the overall planning and management framework within which the various planning and regulatory entities carry out their respective authorities. It is intended that the policy framework contained herein be incorporated into the policies and review criteria of those entities, including, but not limited to, the Department of Planning and Natural Resources (DPNR), the Department of Housing, Parks and Recreation (DHPR), the Port Authority, the Water and Power Authority (WAPA), the Department of Public Works (DPW), the National Park Service (NPS), the U.S. Fish and Wildlife Service (USFWS), the U.S. Army Corps of Engineers (USACOE), the U.S. Environmental Protection Agency (USEPA), and the Department of Property and Procurement. This Study will serve as a guide for future decisions concerning the area. Future development activity should be consistent with the Comprehensive Analytic Study and proposed management plan.

The intent of this Study and proposed management plan is for all participating territorial and federal agencies to utilize the broad policy framework to guide planning and permit decisions with respect to their own authorities. For those agencies that issue permits or review and comment on permit applications, the Study and proposed plan does not eliminate the authority of those agencies, but increases the predictability and timeliness of the permitting process since many of the issues that must be addressed in a specific permit application are already addressed and mandated in the Plan.

The issues surrounding any proposed use or activity within the coastal environment are complex. A proposed use immediately outside the boundary of the APC planning area may result in significant adverse impacts on the APC and impair the goals of the APC management framework described herein. This Plan contains several different forms of guidance, all of which should be considered in evaluating impact on an APC. Both the individual property owner who is considering a specific proposal and the decision-maker who is evaluating the proposal should follow the guidance of this Plan.

## **1.3 Historical Perspective and Overview**

In the early 1970's, Sandy Point was considered as an area for possible industrial development. Because of environmental stresses resulting from two major industries located in the Southshore Industrial Area, it was thought that additional industrial development should be dispersed to avoid overburdening the Southshore area (Insular Environments, Inc., 1972). From the late 1970's until 1982, the West Indies Investment Company mined beach sand within 100-150 feet of the southeast shoreline, and had plans to expand the operation into a large resort development (USFWS, 1992).

Public perception of the area took a significant change when, in 1973, Otto Tranberg, a native Cruzan, began an activist campaign to halt the killing of nesting sea turtles. By 1975, he and a small group of concerned citizens began regular observations and tagging of Leatherback sea turtles; public awareness and concern for protecting the area began to increase. The 1.6 mile stretch of beach (Figure 3) is the only known beach under U.S. jurisdiction used extensively for nesting by the federally listed

endangered Leatherback sea turtle. In 1978, a smaller portion of the Sandy Point beach, 0.8 mile long by 0.1 mile wide, was declared as emergency Critical Habitat by the U.S. Fish and Wildlife Service (section 1.4). In 1979, the National Marine Fisheries Service designated adjacent waters to a depth of 100 fathoms also as Critical Habitat (USFWS, 1992). In 1980, Sandy Point was declared a National Natural Landmark, a program administered by the U.S. Department of Interior.

In 1984, the U.S. Government purchased 398 acres of land, including half of the Westend salt pond, from the West Indies Investment Company. The Sandy Point National Wildlife Refuge was formally established on August 30, 1984.

Since 1981, the Center for Field Research in Watertown, Massachusetts, a division of Earthwatch, has performed sea turtle research at Sandy Point. Saturation tagging and consistent night patrols during nesting season have provided a comprehensive data base for each nesting female Leatherback. Volunteers have worked to protect and/or relocate nests under threat by poaching and/or erosion. Of 345 nests laid in 1992, 145 (42%) were relocated (Dutton, *et al.*, 1992). The previous slaughter of Leatherbacks on Sandy Point has been eliminated, although poaching of eggs and adults of both Green sea turtles (*Chelonia mydas*) and Hawksbill sea turtles (*Eretmochelys imbricata*) continues after patrols for the Leatherback season cease (Dutton, *et al.*, 1992).

Funding for the Leatherback tagging and nesting research has been provided by the USFWS under Section 6 of the Endangered Species Act, and the Center for Field Research (USFWS, 1990b). The Hubbs Sea World Research Institute of San Diego, California has provided researchers to the project for several years. The project objectives are "to protect adults, nests, and hatchlings from predators and poachers, to protect nests from erosion and inundation, and to assess the size, productivity, and management priorities of this population by documenting and tagging all nesting females" (Dutton *et al.*, 1992). Other biological research projects include a study on the territorial listed endangered Least Tern (*Sterna antillarum*) by USFWS, and an ongoing project to study the biology of the mongoose by Dr. Roy Horst of the State University of New York at Potsdam (Section 2.4.1). In 1991, DPNR/DFW undertook a one year study of the seasonal changes in water quality parameters of the Westend Salt Pond, and of the major fauna and flora changes associated with the seasonal water quality fluctuations (USVI Govt/DPNR, 1990). The DPNR/DFW currently monitors Westend Salt Pond and eight other ponds on St. Croix through the Use of Wetlands Monitoring Program.

Other volunteer organizations involved in the management of Sandy Point include the St. Croix Environmental Association (SEA), West End Rotary Club, and Friends of Sandy Point, a student environmental action group.

In July 1990, a proposal was submitted for the development of The Virgin Islands Sea Farm Park (UVI, 1990). The proposed facility was to consist of a visitors center, a mariculture laboratory, and a marine underwater trail. The project was later abandoned when the U.S. Department of the Interior refused permission to use the land.

Sandy Point is an area of exceptional educational value. During the 1992 Leatherback nesting season, there were nearly 750 visitors to the USFWS project (Dutton, *et al.*, 1992). Many local students visit the area on field trips, and high school students on occasion participate in internship programs. Educational videos have been filmed at Sandy Point both for local and stateside viewing. Most

recently a news release was produced by a video film crew from Sea World. This program was an overview of the project and was broadcast on stations around the country (Dutton, *et al.*, 1992).

The DPNR/DFW currently observes and records avian species at Westend Salt Pond and eight other ponds on St. Croix through the Wildlife Use of Wetlands Monitoring Program. A 1991 report describes the mangrove and bird species of the pond (Knowles and Amrani, 1991).

#### **1.4 Other Classifications**

##### **Critical Habitat:**

In 1978, the USFWS identified a portion of the Sandy Point beach as "critical habitat" for the Leatherback sea turtle population. A definition for the term "critical habitat" is as follows (USFWS, 1978):

"Critical habitat" means any air, land, or water area (exclusive of those existing manmade structures or settlements which are not necessary to the survival and recovery of a listed species) and constituent elements thereof, the loss of which would appreciably decrease the likelihood of the survival and recovery of a listed species or a distinct segment of its population. The constituent elements of critical habitat include, but are not limited to: physical structures and topography, biota, climate, human activity, and the quality and chemical content of land, water, and air. Critical habitat may represent any portion of the present habitat of a listed species and may include additional areas for reasonable population expansion.

In 1979, the National Marine Fisheries Service listed the surrounding marine waters to the 100-fathom contour as Critical Habitat for the endangered Leatherback (USFWS, 1992).

The Directory of Neotropical Wetlands recognizes the Westend Salt Pond as an important neotropical wetland for migratory aquatic bird species.

##### **National Wildlife Refuge:**

In 1984, the U.S. Fish and Wildlife Service purchased the 398 acres of land and beach front which today comprise the Sandy Point National Wildlife Refuge (NWR). Its principal function is to protect nesting habitat of endangered sea turtles, but also to protect important habitat for migratory aquatic bird species. The USFWS administers the NWR and employs a full-time Refuge Manager to coordinate the Service's numerous management, research, and public education activities.

##### **Significant Natural Areas (SNA):**

With the adoption of the territorial Coastal Zone Management Program in 1979, several sites in the Territory were identified as potential Significant Natural Areas (SNA's), including the Sandy Point peninsula (USVI Govt/DCCA, 1982). Significant Natural Areas are defined as areas of unique, scarce, or fragile natural habitat or physical features; areas of high natural productivity; or essential habitat for living resources, including endangered species and the various levels of the food chain critical to their well being.



Examples of significant areas are those which harbor unique or remnant plant and animal species of special interest; natural areas that provide scientific and educational value; and areas necessary for nesting, spawning, rearing of young, or resting during migration. Also included are areas needed to protect, maintain, or replenish coastal lands and resources (USVI Govt/DPNR, 1991). The Sandy Point peninsula was identified for its major turtle nesting beach, extensive salt pond, APC designation, National Natural landmark designation, and the valuable sand deposits, and endangered species found therein.

### Coastal Barrier Resources System (CBRS):

Two areas within the Sandy Point APC are found on the final Virgin Islands Coastal Barrier Resources System (CBRS) list of 1990 as sites VI-11 and VI-11P (Figure 4). The "P" designates an "otherwise protected area", in this case meaning the National Wildlife Refuge. Development projects within designated CBRS areas are not eligible for federal assistance of any kind.

The Federal Coastal Barrier Improvement Act of 1990 established areas in the Virgin Islands as part of the Coastal Barrier Resources System. The purpose of this system is threefold (Island Resources Foundation, 1986):

1. to halt development in low-lying areas subject to natural disasters (i.e., flooding, hurricanes, etc.);
2. to stop wasteful federal expenditures in these areas; and
3. to protect valuable natural resources from being destroyed by unwise economic development.

Any kind of federal expenditures (e.g., grants, loans), including federal flood insurance, is prohibited for development projects within a designated CBRS site. The law does not, however, prevent projects from going forward with private backing. Certain exemptions are included for park lands, recreational areas, public recreation infrastructure, and land acquisition.

### Territorial Park System Plan:

The Westend Salt Pond was listed as a proposed recreation area in an early park and recreation plan for the U.S. Virgin Islands (NPS, 1960). This study recommended that fishing shelters be developed along the western strip of land between the salt pond and the open ocean, and that the salt pond be protected as a bird sanctuary. It is in this early study that the idea for a small boat marina at Westend Salt Pond was first put forward (NPS, 1960).

In 1981, Sandy Point was identified as a potential multi-resource park site and a Natural Preserve and Wildlife Sanctuary in a Virgin Islands Territorial Park System plan (Alexander, 1981). This potential park site was also noted in the Virgin Islands Territorial Comprehensive Outdoor Recreation Plan (USVI Govt/DHPR, 1989). Resources listed for the area include the following: valuable sand resources, unique vegetation, major turtle nesting beach, swimming, picnicking, camping, hiking, nature study/interpretation, wildlife habitat, breeding area, and endangered species.

**National Natural Landmark:**

National Natural Landmarks (NNL's) are areas that represent the best examples of the ecological and geological features composing the natural history of the United States and Territories. More than 600 of these areas, showing the great diversity of the natural environment, have been designated by the Secretary of the Interior since 1962 (USVI Govt/DHPR, 1989).

The NPS regularly reviews the condition of NNL's and, upon request by landowners, provides advice on conservation practices. The NPS also prepares an annual report on those NNL's that are damaged or threatened by development activity or natural phenomenon. The Secretary of the Interior sends this report to the U.S. Congress (USVI Govt/DHPR, 1989).

Sandy Point was designated an NNL in June 1988 for its high avian species diversity, unique combination of plant communities, extensive sandy scrub habitat, and nesting area for the Leatherback sea turtle.

**Floodplain:**

The entire Sandy Point peninsula lies within the 100-year floodplain as designated by the Flood Insurance Rate Map of the National Flood Insurance Program (section 2.3.3) [FEMA, 1992].

**2. DESCRIPTION OF THE SITE**

**2.1 APC Boundary**

The boundary for the Sandy Point APC is described as follows (Figure 2) [USVI Govt/DPNR, 1991]:

Beginning at the northwest corner of Estate Smithfield, the boundary extends west to the outer shelf edge or three mile limit (whichever is closer); then follows the outer shelf edge or three mile limit in a southwesterly and then easterly direction around Sandy Point to a point due south of the eastern boundary of Estate Concordia; then extends north to a point on the shoreline at the eastern boundary of Estate Concordia; then west along the shoreline to the dirt road that runs parallel to the western boundary of Estate Concordia; then north along this road to a point where the road intersects a paved road; then west along this paved road to where it intersects with the road that separates Estates White Lady and Stony Ground; and then extends in a straight line northwest along this road and continues northwest in a straight line along the Estate Smithfield boundary to the northwest corner of Estate Smithfield, the point of origin.

**2.2 Ownership Summary**

The Sandy Point National Wildlife Refuge extends to the tip of Sandy Point and encompasses three quarters of the Westend Salt Pond. The Refuge portion is owned by the U.S. Federal Government (Figure 2). A portion of the land adjacent to the northwest corner of the Refuge is owned by the V.I. Government and is managed as the Vincent Mason Recreational Complex by the Department of Housing, Parks and Recreation. A small area east of the pond is zoned for low to medium density

residential and is privately owned (Figure 5). This area includes the Estate White Lady public housing.

The ownership of the northern half of the Westend Salt Pond is an issue which is presently unresolved. Private ownership is claimed for this portion of the pond and adjacent land areas, and plans are being developed to open the northern portion of the pond for a major development to include a hotel, marina, resort villas, shopping village, and convention center (section 3.2).

(Title to submerged and tidal lands was conveyed from the U.S. Government to the U.S. Virgin Islands Government in 1974 with the passage of P.L. 93-435, codified at 48 U.S.C. Section 1705. This Act specifically conveyed ownership of all lands "permanently or periodically covered by tidal waters", to the USVI Government, except for land conveyed to a private party by the Danish or U.S. Government prior to transfer of the Territory to the U.S. Recently, the USVI Attorney General ruled that "the lands under Red Hook Salt Pond are in fact lands beneath tidal waters and are therefore owned by the V.I Government" (Opin. Atty. Gen. Apr. 4, 1990)).

## 2.3 Physical Environment

### 2.3.1 Climate

Rainfall in the Virgin Islands generally increases with increasing elevation and exhibits a trend on each island of a dry-to-wet cline from east to west. Average rainfall data, compiled from several years of records at various stations can be misleading in that it probably poorly represents the available precipitation at a particular area in any given year. The U.S. Virgin Islands receive an average of 41 inches of rain per year (Bowden, 1968).

The wettest months are September to December, and the dry season is February to July. Most of St. Croix, including Sandy Point, receives 35-45 (average about 40) inches of rainfall per year. The northeast hills receive slightly more, and Annaly, the wettest area, receives an average of 52 inches per year (Bowden, 1970). Rainfall usually occurs in brief, intense showers of less than a few tenths of an inch.

Temperatures average an annual 79 degrees Fahrenheit, with the winter low averaging 76 degrees F and the summer high reaching an average of 84 degrees F.

The Virgin Islands are located in the area of "easterlies" or "tradewinds" which circulate around the Bermuda high pressure area to the north. The wind and wave patterns of the islands are directly related to these patterns. Predominant winds are thus from the east-northeast and east (Island Resources Foundation, 1977). The intensification of the high results in severe winds occurring during the winter and hurricanes in the fall (Hubbard, *et al.* 1981). Hurricane season is from June to November, with peak activity occurring in September. The annual probability of a hurricane is once every 16 years (Bowden, 1974).

### 2.3.2 Geological Setting

The island of St. Croix is primarily sedimentary in origin (Whetten, 1966). These volcanic sediments were deposited deep on the ocean floor in the late Cretaceous period (approximately 80 million years

ago). The rocks which underlie the mountain ranges are sedimentary, formed by debris from eroding volcanic rocks (Whetten, 1974). Two predominant mountain ranges exist (the Northside Range and East End Range), separated by a central sediment-filled valley. At one time, the two ranges were distinct islands, separated by a submerged lagoon environment, which during a later period of uplifting formed the present sediment-filled valley and island of St. Croix. The shelf morphology is variable, as are the production and transport of sediments (Hubbard, *et al.*, 1981).

Sandy Point is a unique formation in the USVI that is thought to be the result of oscillating north and south shore currents during the Pleistocene epoch (approximately one million years ago) which formed sand spits that gradually closed to form the Westend Salt Pond. It is thought that the large amount and energy of offshore sediment transport has buried Holocene reef topography and created "sediment wedges" at the shelf margin and on the island slope (Roberts, *et al.*, 1981). The beach at Sandy Point is the most unstable beach on St. Croix with the largest supply of sand (pers. comm., D. Hubbard, Geologist). Hubbard suggests that the sand supply is due to the large amount of carbonate-producing algae (*Halimeda*) which exists offshore. Sediment transport at Sandy Point has been described in detail by Roberts, *et al.*, (1981). See also Section 2.3.4.

The predominate soil types in this APC include the following (U.S. Department of Agriculture, 1970):

***Jaucas sand, 0 to 5 percent slopes (JuB):*** This soil type is found bordering the southern portion of the pond and extending along the western coast. This soil has a sandy texture and is formed of particles of coral and seashells. It occurs along the sandy coastal areas of the islands. Because of its low fertility, low water-holding capacity, very rapid permeability, and conditions of deep sand and high tide, it has severe limitations for most uses. Jaucas sands are the predominant contributors to the production of marine sediments (pers. comm., D. Hubbard, Geologist).

***Diamond-Limestone rock land complex, 0 to 5 percent slopes (DIB):*** This soil type is found bordering the eastern portion of the Westend Salt Pond. The soil was formed in sediments derived from limestone and occurs near coastal areas in the southern and southwestern parts of St. Croix. It has severe limitations for most uses due to the shallowness and rock outcrops. The Diamond-Limestone rock land complex is probably weathered outcrops of rock which are Pleistocene and Miocene in age.

### Historical seismicity in the USVI

As a result of convergence between the Caribbean and North American tectonic plates, the Virgin Islands are located in one of the most earthquake prone regions of the world (Geoscience Associates, 1984a). During the past 450 years, damage has occurred from earthquakes and associated tsunamis. Destructive tsunamis occurred in the U.S. Virgin Islands in 1867 and in 1918; the latter resulted in 116 deaths and economic losses estimated at \$4 million (in 1918 dollars) [USGS, 1984]. The 1867 tsunami was reported to have a wave height of 27-feet above sea level (Geoscience Associates, 1984b).

Potential human and economic losses for a similar event occurring today would be several orders of magnitude higher. Scientists report high seismic potential for a major fault rupture in the Puerto Rico Trench north of Puerto Rico and the Virgin Islands (USGS, 1984). The Virgin Islands are classified

as "Zone 4" for earthquake vulnerability, the highest damage zone and the same classification given to many parts of California (Brower and Beatley, 1988).

Studies prepared in 1984 estimated that an earthquake of MMVIII intensity (Modified Mercalli Scale, a forerunner to the now used Richter Scale) has a recurrence period of between 110 and 200 years for the St. Thomas/St. John area. The probability of such an earthquake occurring in the next twenty years is between 50 and 70 percent, and between 60 and 80 percent during the next 50 years (Geoscience Associates, 1984a and 1984b). It is not clear whether the same probabilities can be assigned to St. Croix, as St. Croix is situated on a different shelf platform than St. Thomas and St. John. Nevertheless, the waterfront areas of Charlotte Amalie and Christiansted are vulnerable to impacts from earthquakes due to substantial construction on recently filled (reclaimed) land. Presumably this would be the case as well for construction on reclaimed lands in the Salt River Bay area. It is these areas where liquefaction and ground settling are likely to be the greatest. Buildings constructed on loose alluvial or man-made fill soils along the waterfront are at risk of destruction should an earthquake occur (Geosciences Associates, 1984b).

### **2.3.3 Hydrological Setting**

There are two salt ponds and two ephemeral brackish or fresh water ponds which exist within the APC. The Westend Salt Pond, the largest of these ponds (100 ha), is a hypersaline closed lagoon that remains at or near sea level year round. The pond is up to 2 m deep and usually has no surface connection to the sea. There is, however, ample evidence that suggests that subsurface connections exist.

Salinity levels measured at several stations within the pond have shown considerable salinity differentials (Figure 3). Salinity levels at several sampling stations measured 81 parts per thousand (ppt), while at Seaman's Point (the location of a rock fissure and suspected subsurface connection to the sea) salinity was simultaneously measured at 46 ppt, indicating that perhaps seawater (with a normal salinity range of 34-35 ppt) had seeped into the Pond. Similarly, elevated salinity levels (43 ppt) measured immediately offshore from the Recreational Complex indicate the seepage of hypersaline water from the Pond to the sea (Tobias, 1993).

Water level in the Westend Salt Pond is mainly affected by rainfall, although the subterranean tidal influence is cause for some fluctuation (USVI Govt/DHPR, 1987; USFWS, 1992; Rice, 1993). Knowles (1993) has indicated that the pond has not completely dried up between 1989-1993 owing to the subterranean tidal influence. All other ponds in the area not connected to the sea have annually dried up. The smaller of the salt ponds lies to the southeast of Westend Salt Pond, and occasionally dries up during extended periods of no rainfall.

The following description of the biological and physical functions of salt ponds is adapted from Island Resources Foundation (1977):

The salt ponds at this site and throughout the Virgin Islands differ appreciably depending upon the amount of freshwater and seawater flowing into the pond. In general, salt ponds have a complex and dynamic ecology. Common animals are fiddler crabs and the larger land crabs (*Cardisoma guanhumi*). Several kinds of insects which prefer saline environments live or breed there, including flies and several kinds of midges. Mosquitoes may breed there during brief periods when heavy rains

sufficiently lower the salinity. Several kinds of microscopic algae float in the water, sometimes giving it a green, pink, orange, brown, or red color. Other micro-algae grow as mats on the shallow margins.

A number of wading birds (stilts, sandpipers, etc.) feed along the edges of the ponds on crabs, insect larvae and other small animals. Salt ponds frequently contain large numbers of brine shrimp which is in great demand throughout the world as food for aquarium fish, aquaculture and research organisms. Thick blooms of these shrimp can give the pond water a brownish-pink tinge. If the pond is or has been recently open, it will contain fish (sennet, small barracuda, mullet, tarpon, snook, etc.) and marine crabs. These are fed upon by kingfishers, herons, and ospreys. Kingbirds, martins, free-tailed bats, and swallows occasionally feed on flying insects over the water (Knowles, 1993).

The local animals and plants associated with salt ponds are not well known, and the complex ecology of the ponds can only be inferred in simple outline. They have never been studied properly. It is known that in some salt ponds salinity changes over a very wide range. It may be concentrated to more than three times that of sea water (over 100 ppt) or be depressed by heavy flooding to almost freshwater (depending on the volume of flood water, the size of the pond and the permeability of the pond-bay barrier). Periodic changes of even one-third of this magnitude will cause significant changes in the types and numbers of organisms inhabiting the pond. Slow changes, as by evaporation concentrating the salt, promote a gradual die-off of some forms of animal life and a gradual invasion and development of others. There is a constant, slow modification of the natural community in response to this change.

Sudden changes in salinity, caused by flood water, for example, results in catastrophic changes in the biota. Masses of halophilic (salt-loving) forms are killed while other types, suited to the new, less saline environment, quickly invade the pond and become established. Following heavy flooding, many ponds contain great amounts of dead halophilic algae, insects, etc. These often account for the occasionally bad odor found in a pond.

Other environmental characteristics of salt ponds are high concentrations of hydrogen sulfide, especially in the sediments (from the decay of dead organic matter), high temperature (from insolation and lack of shade), low dissolved oxygen (from high temperature, salinity and BOD), and high turbidity (from large concentrations of land and pond-derived solids).

Although no specific data is available, it is safe to assume that ponds also contain higher concentrations of most pollutants than, for example, their adjacent associated bays. This is likely because of the natural functions of salt ponds as buffer zones and sumps. As they are located between the bay and its upland watershed, they receive and trap most of the runoff from the land, thus protecting the bay.

Sediment coring in several local ponds has revealed thick layers of terrigenous (land-derived) mud and silt interbedded with layers of organic muck, algal mats, and sand lenses. The latter may have been deposited during periods when the pond was open to the sea, or when a hurricane or other violent storm broke open the pond or threw waves over the berm bringing sea sand into the pond.

Most of the upper layers of pond sediment are highly organic and have been anaerobically decomposed, disturbing these sediments usually releases obnoxious sulfide odors. When these materials are dispersed, they use up the available oxygen rapidly. This can kill animals and the water.

Attributes/Use Options for Salt Ponds

Act as natural catchment and settling basins to protect marine resources.

Provide feeding places for wading birds, insects, and fish-eating birds.

Low in dissolved oxygen, frequently less than four mg/l.

Aquatic biota limited to few organisms which are tolerant of high and fluctuating salinity.

Bird diversity, and overall productivity, can be high.

Use Limitations of Salt Ponds

Sediments unstable for foundations; pilings almost always required.

Sediments are fine, toxic, and have high oxygen demand; they can be dangerous to adjacent marine biota if released.

Modification may adversely alter drainage and runoff, and thus flooding patterns.

If filled, the weight of overburden may, depending on the nature of pond sediments, extrude these sediments at certain points.

Nature of sediments may limit use of deep-rooted vegetation on overfill.

Modification will alter or destroy habitat for associated birds.

Tolerances of the system appear to be wide, but this needs to be verified by scientific studies. All systems and their components have tolerance limits. Obviously, massive inputs of toxic materials will destroy the ability of the system to function. Filling a pond will completely destroy its function as a catchment basin and aquatic habitat. Artificially opening the pond to the sea will significantly change its ecological function and perhaps that of the adjacent marine environment.

It has been suggested that the hypersaline conditions which presently exist in the Westend Salt Pond are due in part to the solid road structures which have been put in place on the coastal perimeter of the pond (pers. comm., F. Lopez, USFWS). These structures are barriers to the natural flushing of the pond and breaching of the berm by the sea.

Aquatic biodiversity in hypersaline conditions is normally low, but avian diversity can be high as in the case of Westend Salt Pond. The harsh environment of salt ponds, including fluctuations in salinity, Ph, dissolved oxygen, and temperature, generally pose problems for aquatic organisms,

resulting in low aquatic biodiversity (Copeland, 1967). The productivity level of the Westend Salt Pond also fluctuates and can be high at certain times of the year (Knowles, 1993).

The major watershed affecting the area is shown in (Figure 6). The topography of Sandy Point is flat with slightly varying elevations around the eastern portion of the Westend Salt Pond.

The entire APC is located within the 100-Year flood zone (Figure 7). Both A-Zone and V-Zone floodplains exist within the APC. V-Zones are areas of 100-year coastal flood activity with velocity (wave) action, within which base flood elevations (BFE) are determined. Base flood elevations dictate how high above ground level new structures must be built. Virtually the entire shoreline within the APC is within the V-Zone (FEMA, 1992). Flooding may be caused by both inundation of the sea and/or by concentrated runoff from the watershed during intense rainfall. The flood hazard designations shown on the map relate to the frequency and severity of the flooding that can be expected to affect any one area.

The Westend Salt Pond is an important floodwater storage and retention area, providing a temporary storage of large amounts of storm and/or rain water and reducing the force of floodwaters.

#### 2.3.4 Coastal Environment

The beach at Sandy Point is made up of three miles of sand. A relatively narrow shelf platform surrounds the peninsula and there is no fringing reef around the point. Currents around the point are complex with two distinct pulses to the west and south. The currents around the southwest point are unusually strong due to a current jet or "rip" that is caused by the curvature of the coastline and the deformation of longshore waves as they round the island. Current speeds of 50 cm/sec are common, and velocities of 100 cm/sec have been recorded (Roberts, *et al.*, 1981).

The tides on St. Croix vary between diurnal and semi-diurnal and have a spring-tidal range of 0.24 m. Wave heights are normally 1-2 m (3.3-6.6 ft) and can increase to over 5 m (16.4 ft) during storms (Hubbard, *et al.*, 1981).

#### 2.4 Biological Environment

##### 2.4.1 Terrestrial

The diverse biogeographical formations of the area, including the sea, beach, woodland, and wetland, provide a unique environment for as many as 225 species of plants (USFWS, 1992). An area of littoral and shrub woodland is found inland from the beach and includes Seagrape (*Coccoloba uvifera*), Cocoplum (*Chrysobalanus icaco*), Acacia (*Acacia tortuosa*), Tan-tan (*Leucaena glauca*), Wild Sage (*Latana involucrata*), and others. The beach plants include Beach Grass (*Sporobolus virginicus*) and Sea Purslane (*Sesuvium portulacastrum*). Manchineel (*Hippomane mancinella*), Water Mampoo (*Pisonia subchordata*), Gumbo Limbo (*Bursera simaruba*), Fish Poison Tree (*Piscidia piscipula*), Touch-Me-Not (*Malpighia infestissima*) and Pipe Organ Cactus (*Cerevs evnei*) are also present. The species which surround the pond include White Mangrove (*Laguncularia racemosa*), Buttonwood (*Conocarpus erectus*), and Black Mangrove (*Avicennia germinans*) (Knowles and Amrani, 1991).



Indigenous orchids (*Cycalis mcconnelliae*, among others) can also be found, all of which are locally listed as endangered species.

There are 99 species of birds which are known to use the unique ecosystem of Sandy Point. Migrating shorebirds and other neotropical migrants use the refuge during the spring and fall as staging, resting, stopover, and/or end points during migrations. Twenty-two bird species, including the territorial endangered Least Tern (*Sterna antillarum*), nest on the beach and in other areas of the refuge. Species which nest in the mangrove communities surrounding the ponds include Mangrove Cuckoo (*Coccyzus minor*), Black-crowned Night Heron (*Nycticorax*), and White-crowned Pigeon (*Columba leucocephala*) [USFWS, 1992].

Presently, a study is being conducted on Sandy Point by Dr. G. Roy Horst, of the State University of New York at Potsdam, on the biology of the mongoose. Sandy Point, St. Croix, and Cabo Rojo, Puerto Rico are the two sites which are being used for the comparative study of the mongoose. According to Dr. Horst, "the mongoose population at Sandy Point has apparently reached carrying capacity, with an average density of six or more mongoose per hectare" (*Daily News*, 12 January 1993). Successful control of the introduced mongoose is important for wildlife management generally (section 3.2).

A study of the population status and breeding success of Least Terns on St. Croix was conducted between 1986-1988 and a final report was submitted to USFWS in 1988. The study was resumed by DPNR/DFW in 1989 and data collection is continuing.

One fish species has been found and identified for the Westend Salt Pond. *Poecilia orri* (common name unknown), is an extremely salt tolerant species found throughout the Lesser Antilles. This is its only known location in the U.S. Virgin Islands. It is a food source for herons and egrets (Knowles, 1993). The fish, while not considered to be in need of protection (regionally), may not survive if salinity levels in the pond are substantially altered.

#### 2.4.2 Marine

Sandy Point is one of only thirteen known regularly used nesting sites for Leatherback sea turtles in the world.

The eleventh consecutive season of research on the nesting ecology and population biology of the endangered Leatherback sea turtle at Sandy Point NWR was completed in July of 1992 (Dutton, *et al.*, 1992). In 1992, there were 345 nests laid by 54 female Leatherbacks, producing 17,684 hatchlings at Sandy Point (USFWS, 1992). Nesting season for the Leatherback is from February to July, with the peak period in mid to late May (Boulon, 1990). Leatherback sea turtles may migrate from as far north as Newfoundland. Nesting occurs at night, and each Leatherback averages five visits per season at ten day intervals and lays from 60-100 eggs per nest. Boulon (1990) and Dutton, *et al.* (1992) provide additional details of the reproductive biology and migration patterns of the Leatherback.

### 2.4.3 Endangered Species

The U.S. Endangered Species Act defines "endangered species" to mean a species or subspecies that is in imminent danger of extinction throughout all or a significant portion of its range. "Threatened species" are those likely to become endangered in the foreseeable future unless current trends are reversed. Such species are protected by Federal law; neither the whole animal or any products from it may be taken, sold, or possessed. Alteration of the habitat in which any of these species occurs may be, in certain cases, prohibited or constrained.

The V.I. Legislature has also passed endangered species legislation. Known as the Indigenous and Endangered Species Act of 1990, the bill (Act 5665), signed into law in December 1990, authorizes the Commissioner of DPNR to promulgate a list of endangered and threatened species in the Virgin Islands. The V.I. Government, Department of Planning and Natural Resources, Division of Fish and Wildlife maintains a list of locally endangered or threatened species.

The following information for endangered wildlife species which occur at Sandy Point was provided by W. Knowles, DPNR/DFW Wildlife Biologist, (pers. comm.).

All three species of federally listed endangered sea turtles use the beach at Sandy Point for nesting. These include the Green Turtle (*Chelonia mydas*), the Hawksbill Turtle (*Eretmochelys imbricata*) and the Leatherback Turtle (*Dermochelys coriacea*). The federally listed endangered Brown Pelican (*Pelecanus occidentalis*) feeds in the pond and uses the beach rock across from the recreational center as a roost. The federally listed endangered Peregrine Falcon (*Falco peregrinus*) hunts and feeds on shorebirds using the pond or beach. Territorial listed endangered shorebirds, egrets and the fisherman bat (see list below), feed on fish or insect larvae in the pond (Knowles, 1993).

Territorial listed endangered species which have been known to use the pond and surrounding areas include the following\*:

- \*West Indian Nighthawk, *Chordeiles gundlachi*
- Great Blue Heron, *Ardea herodias*
- Great (Common) Egret, *Casmerodius (Egretta) albus*
- Snowy Egret, *Egretta (Leucophoyx) thula*
- Black-crowned Night Heron, *Nycticorax*
- \*Least Bittern, *Ixobrychus exilis*
- Bahama Duck, *Anas bahamensis*
- \*Snowy Plover, *Charadrius alexandrinus*
- \*Willet, *Catoptrophorus semipalmatus*
- \*Roseate Tern, *Sterna dougallii*
- Least Tern, *Sterna antillarum*
- Fisherman Bat, *Noctilio leporinus*

\*Indicates that a species is likely to use area although few or none have been seen.

One federally listed endangered plant species, Vahl's Boxwood (*Buxus vahlii*), and one candidate species (*Malphigia infestissima*) are found along the Westend Salt Pond's northeast shore (Oland, 1993).

## **2.5 Cultural Resources**

### **2.5.1 Prehistoric**

The most significant prehistoric site within the APC is the Aklis site (Figure 3). The Aklis site is among St. Croix's most thoroughly excavated sites (NPS, c. 1976). Most of the pottery found is of the Richmond style (c 700-900 AD) [NPS, c. 1976]. The Aklis site was placed on the National Register of Historic Places on July 1, 1976. It is also on the List of the Archaeological Sites of the Island of St. Croix, and has been given a significance rating of 1 which indicates the highest priority for preservation (OAS, n.d.).

Although there have been many excavations at the Aklis site, the survey efforts have either been poorly documented or not reported on at all. A large portion of the Aklis site remains untouched (pers. comm., E. Righter, DPNR/DAHP). Many aspects make it one of the most interesting archaeological sites on St. Croix. Relatively large numbers of splintered and disjointed human bones have been found in the area, and there is also an exceptional amount of conch shell midden as well. The pottery found here is reported to be of better quality than that which has been found elsewhere on the island.

Recently, an additional prehistoric site, the Sandy Point prehistoric site, was identified on the eastern shore of the Westend Salt Pond. DPNR/DAHP has given this unusual site a high priority for preliminary testing, mapping, and preservation. In addition, testing at Hesselberg Cave, located within the APC, has yielded fossil animal bones. The site was determined, however, to be of paleontological rather than cultural interest. Nevertheless, as a paleontological site, Hesselberg Cave should be included among the unique resources of the Sandy Point APC (pers. comm., E. Righter, DPNR/DAHP).

### **2.5.2 Historic**

The Smithfield site is a historic sugar mill located just outside the APC boundary (Figure 3) and is on the List of the Archaeological Sites of the Island of St. Croix (OAS, n.d.).

## **2.6 Built Environment**

### **2.6.1 Roads**

One dirt road leads into the refuge from the southeast corner and has several branching points along its way leading to the beach. These latter road cuts have been blocked to prevent vehicular traffic on the beach (Figure 8). A coastal road along the northwest coast of the peninsula provides access to the Vincent Mason Recreational Complex. The only other road within the APC provides access to the residential subdivision on Estate Sandy Point.

### 2.6.2 Water Systems

Traditionally, water use on St. Croix has relied on rain catchment and storage in household cisterns. Since the late 1960's, several desalination plants have been commissioned, and a water supply distribution system is now operated by the Water and Power Authority (WAPA). The public water supply is increasingly augmented by groundwater supplies. Hand dug wells of the Danish colonial period have been replaced with a rapidly increasing number of modern drilled wells for both household and public supply use (Gill, 1990).

Groundwater provides approximately 43 percent of the potable water distributed through the public system on St. Croix (pers. comm., K. Thomas, WAPA). Presently, WAPA has the capacity to supply 1 MGD of well water and 2.3 MGD of desalinated water. Supplies are not enough to meet demand, and periodic rationing is necessary (pers. comm., K. Thomas, WAPA). A new 1.3 MGD desalination plant will become operational at Richmond in mid-1993 (pers. comm., K. Thomas, WAPA).

The principal groundwater aquifer on St. Croix underlies the southern, southwestern, and central part of the island (Figure 9). The aquifer is known as the Kingshill Aquifer. Groundwater withdrawals have increased from about 0.05 to 0.8 MGD since the early 1960's. Various modeling of the Kingshill aquifer has been carried out, indicating that withdrawal rates can be increased by 10-30 percent with the addition of new recharge sources (e.g., construction of surface retention basins). On the other hand, without such improvements to total recharge rates, an increase in water discharge (pumping) rates in excess of 1.20 MGD could substantially lower the potentiometric surface and, thus, induce saline water intrusion (Torres-Gonzalez, 1990).

St. Croix has the greatest potential in the Territory for groundwater use due to its larger land area, less steep topography, and landforms which enhance recharge rates (CH<sub>2</sub>M Hill Southeast, 1983). Most groundwater suffers poor quality, however, due to chlorides, sodium salts, and total dissolved solids (TDS) concentrations in excess of USEPA drinking water standards. Several hundred wells are privately owned in addition to the 200 or so public and industrial wells in use.

WAPA has negotiated with VIALCO to purchase excess desalinated water (approximately 1 MGD) to augment public supplies. An agreement has been reached, but awaits signatures of both parties.

WAPA is currently (early 1993) discussing plans to construct a desalination plant in Frederiksted. A one million gallon tank is proposed for groundwater storage, to be mixed with desalinated water to provide an additional 200-250 thousand GPD of potable water. WAPA is currently seeking permission from the Department of Housing, Parks, and Recreation to utilize approximately 1 acre of land near the Lagoon Street pump station (pers. comm., K. Thomas, WAPA).

The western end of St. Croix presently receives publicly supplied water with higher mineral content (than that which Christiansted receives) due to the higher percentage of groundwater in the supply. The new plant would eliminate the in-line chlorination process which is currently used and would utilize more groundwater to increase total potable water supplies for the island (pers. comm., K. Thomas, WAPA).

### **2.6.3 Wastewater Systems**

St. Croix's sewage pumping and treatment facilities consist of a primary sewage treatment plant (STP), built in 1972 at Estate Anguilla, and 14 pump stations. The STP was designed to handle flows of 4.0 MGD and, as of May 1992, flows averaged approximately 2.8 MGD (Tetra Tech, 1992). The STP operates at 50 percent capacity on dry days, and at near full capacity during rainy periods, an indication of the amount of stormwater infiltration/inflow in sewer lines (Strategic Planning Group, 1991).

Under the Territorial Pollutant Discharge Elimination System (TPDES), the St. Croix STP is classified as a "major" facility because it receives more than 1.0 MGD of wastewater. The STP has a 1.9 mile ocean outfall located immediately south of Estate Anguilla on the island's central southshore.

The STP and four of the major pump stations, including the Lagoon Street pump station in Frederiksted, require rehabilitative improvements (USEPA, 1992). The use of salt water flushing systems and the high wastewater strength (a result of limited water availability) have contributed to advanced deterioration of the entire system. The result has been numerous breakdowns during the past several years, which have required that raw sewage be pumped directly into coastal waters while maintenance on the system is carried out. A previously used sewage outfall pipe located south of the Frederiksted pier is today the discharge point for bypass sewage at such times when the Lagoon Street pump station, or the Anguilla STP, is not working. A natural waterway adjacent to the pump station and running into La Grange Gut is cleaned periodically for storm water flow.

Most, if not all, of the residential structures within the APC are now connected to the municipal sewage system.

### **2.6.4 Energy Systems**

Power for St. Croix is generated at the Richmond power plant on the western outskirts of Christiansted. Power outages are common. A new 22 megawatt power plant will be constructed during 1993 at the Southshore Industrial Area. The new power plant is badly needed, as WAPA has projected an average of 50 days/year of insufficient power supply given current supply/demand rates. In 1991, St. Croix experienced 304 hours, or 12.5 days, of insufficient supply (*Daily News*, 12 July 1992). The two large industries, HOVIC and VIALCO, operate independent power systems for their operations.

### **2.6.5 Solid Waste Disposal Systems**

St. Croix's only municipal solid waste landfill is located on the central southshore, at Estate Anguilla within the Southshore Industrial APC. All residents, including those located within the Sandy Point APC, are responsible for disposing of solid waste in large roadside dumpsters which are transported to the landfill by a private contractor. Businesses are required to provide for their own solid waste removal.

### 3. RESOURCE USE, USE CONFLICTS, AND ADVERSE IMPACTS

#### 3.1 Resource Use

A major portion of the APC is comprised of the National Wildlife Refuge. Public use of the area includes wildlife educational programs and many types of recreation.

Daytime use of the beach area includes such activities as horseback riding and racing, picnicking, swimming, volleyball, horseshoes, sunbathing, and other recreational activities. Occasionally, the beach is also used for the operation of Off Road Vehicles (ORV's), although attempts have been made by USFWS to barricade beach access via the many illegal road cuts to the beach. Many of these activities also occur illegally at night when the refuge is closed to visitors. Illegal activities include camping and the use of cooking fires and bonfires. Horses and motor vehicles on "lightly used beaches or recreational areas" are also prohibited by law (32 V.I. C. Section 26(b)).

Sandy Point is a popular beach for weekend use by local residents; As many as 100 people and 30 vehicles are reported on an average weekend day (USFWS, 1990b).

The Vincent Mason Recreational Complex, formerly known as the Stoney Ground Coral Recreational Facility, is managed by the Department of Housing, Parks and Recreation. The complex consists of a pavilion, picnic area, beach, and pool.

Three public housing projects exist within the watershed affecting the APC. The Harrigan and Marley housing projects are located directly south of the town of Frederiksted. The Walter I.M. Hodge housing project is located east of the salt pond on Estate Sandy Point, and is now hooked up to the municipal sewage system (Figure 10).

Low to medium density housing is found on Estates Concordia, White Lady, and Smithfield, which are located along the eastern boundary of the APC. A row of beach condominiums is located on the beach berm along the northern portion of the Westend Salt Pond.

The Bay Road sewage lift station is located at the northwest tip of the salt pond on the road which borders the sea (Figure 10). Emergency bypass from the lift station into the pond is not reported to be a problem. However, an emergency power generator will be installed at this lift station to ensure continued operation of the pump station during power outages.

#### 3.2 Use Conflicts

The public use of the beach, especially on weekends, results in large amounts of trash which accumulate throughout the National Wildlife Refuge. Trash is not only unsightly and a public health concern, but also attracts mongooses which are a threat to nesting sea turtles and birds. The mongooses prey on young sea turtle and bird hatchlings, and eat bird eggs when left unguarded (USFWS, 1990b).

The pond area has been used as a dumping ground for derelict cars, appliances, etc.

Vehicles which are driven through and parked in the refuge damage both fauna and flora. Off Road Vehicles (ORV's) can damage sea turtle nesting sites, and crush both eggs and emerging hatchlings. Tracks made in the sand by these vehicles impede the movement of turtle hatchlings to the sea. Also at risk from this use of the beach are groundnesting birds which use the area, including Wilson's Plover (*Charadrius wilsonia*), Black-necked Stilt (*Himantopus mexicanus*), and Least Tern (*Sterna antillarum*). The operation of these vehicles causes abandonment of the nests as well as egg and chick mortality (USVI Govt/DHPR, 1989).

Recreational activities including volleyball and horseshoes that poke holes in the sand, are an additional threat to nesting sea turtles. Nests and eggs can be damaged and holes in the sand are life threatening to emergent hatchlings who may fall in and, unable to reemerge, die in the hot sun.

Noise levels are often high due to the use of loud car speakers and other stereo equipment. The peninsula is underneath the approach path to the Alexander Hamilton Airport approximately five miles away. Although not documented, loud noise may be disruptive to both sea turtle and bird nesting.

Horses are regularly exercised on the beach at Sandy Point, creating a potential risk to turtle nests. Signs are posted which prohibit horses on the beach during nesting season, however, this continues to be problematic. Horses can crush emerging hatchlings and create tracks which the hatchlings can fall into (Dutton, *et al.*, 1992).

Crime is known to be a problem at Sandy Point and in the public housing projects nearby. Law enforcement in the area is not adequate, especially for the number of people using the Refuge. Violent crime is not unknown for the area, and many locals and informed tourists refuse to enter the area for this reason.

During the weeks following Hurricane Hugo, an area at Sandy Point was excavated and used to dispose of contaminated medical waste. A pit which was approximately six feet in depth was filled with 150-300 bags marked "contaminated trash". Several months later, upon request from the USFWS, the contaminated wastes were removed (USFWS, 1989).

A private developer has informally proposed a major development on 100 acres of the northern portion of the Westend Salt Pond. The proposal calls for the construction of a hotel, marina, resort villas, shopping village, and convention center. The developer proposes to cut two channels, connecting the salt pond to the sea along the west coast of Sandy Point peninsula. A bridged road would bisect the pond along a line extended west from Centerline Road. The northern portion of the bisected pond would be dredged (to as yet unspecified depth) to service a proposed marina (Daggett, 1992). The proposed development will certainly alter the ecology of the Westend Salt Pond and its adjacent habitats.

### 3.3 Adverse Impacts

#### 3.3.1 Water Quality

Referring to section 2.3.3 above, the Westend Salt Pond is, like all naturally occurring salt ponds, the source of occasional odors as a result of either a build up of hydrogen sulfide (from decaying organic

matter) or the sudden die-off of aquatic organisms due to a dramatic salinity or temperature fluctuation. The northern portion of the Westend Salt Pond exhibits such tendencies more so than the rest of the pond.

At one time, sewage from the Hodge public housing project was discharged directly into the Westend Salt Pond. The project is now hooked up to the municipal sewage system and, in general, human impact to the Salt Pond is considered to be relatively insignificant (pers. comm., W. Tobias, DPNR/DFW). A one-year data collection program conducted by DPNR/DFW at two separate sites within the pond (one at Seaman's Point and the other near the recreational complex) indicates the following ranges of water quality parameters (Tobias, 1993).

Salinity: 51-84 ppt

Dissolved Oxygen: 4.6-13.6 mg/l

Turbidity: 15-125 NTU

Temperature: 23-35°C.

The water quality parameters of the Westend Salt Pond display a wider range of values than those of oceanic systems in the Virgin Islands. For example, oceanic salinity ranges from about 34-36 ppt, coastal seawater temperatures range from about 25-30°C, and turbidity is generally low (e.g., 3 NTU's). Only species tolerant to these fluctuations are able to survive and flourish in this environment.

One DPNR/Division of Environmental Protection (DEP) coastal water quality monitoring station (#27) exists within the Sandy Point APC. It is located in the shallow sea directly across from the swimming pool at the Vincent Mason Recreational Complex. The water quality at Sandy Point is generally good. DPNR/DEP monitors water quality quarterly (pers. comm., R. Addley, DPNR/DEP). Parameters monitored include: fecal coliform, turbidity, temperature, salinity, and dissolved oxygen. The University of the Virgin Islands (UVI), St. Croix campus, analyzes up to ten (10) samples each quarter for DEP for total suspended solids, nitrogen, and phosphorus.

### 3.3.2 Air Quality

Air pollution is not presently a significant issue for the Sandy Point APC.

### 3.3.3 Noise Pollution

Noise created by recreational activities on the beach at Sandy Point is a potential threat to nesting birds and sea turtles, as well as other wildlife. The APC also lies below the principal approach path to the Alexander Hamilton Airport.

### 3.3.4 Impacts to Biological Resources

The population of sea turtles is at risk for several reasons.

1. Erosion of the beach has been estimated to cause a loss of as much as 50-60% of the nests during past seasons (USFWS, 1990b). Relocation (collection and reburial) of eggs to more stable beach areas has considerably reduced the loss.



2. Poaching has been a problem in the past that has been lessened by the number of researchers and observers in the area. However, poaching of eggs and adults of Green and Hawksbill sea turtles after nightly patrols end for the Leatherback season continues to be a problem (Dutton, *et al.*, 1992).
3. The large number of mongooses in the area poses a potential threat to sea turtle hatchlings. In 1990, it was reported that on 15 occasions, mongooses were seen digging in the area of nests where hatchlings were about to emerge (USFWS, 1990b).
4. Trash on the beach and in other refuge areas poses significant threats to the sea turtles. Trash in the water which is ingested by adult turtles can be lethal. Trash on the beach is a barrier to hatchlings making their way to the sea, and attracts predators including mongooses and ghost crabs (Dutton, *et al.*, 1992).
5. Horses which are regularly exercised on the beach can crush emerging hatchlings and create tracks which the hatchlings fall into and cannot emerge from (Dutton, *et al.*, 1992).
6. Lights from the Paul E. Joseph stadium disorient hatchling turtles causing them to migrate landward instead of seaward, increasing the probability of predation or desiccation.

The feeding and nesting of many bird species are adversely affected by the heavy recreational use of Sandy Point beach. High levels of noise and activities disturb nesting birds, including many which are federally and locally endangered.

Physical modification of a salt pond significantly alters its ecology, with profound effects on aquatic and wildlife species. The following general impacts are likely with physical modification of a salt pond:

1. Dredging a salt pond (or filling with additional water) to depths beyond 35 cm will immediately render the habitat useless for even the largest wading birds (egrets and herons) and dabbling ducks (i.e., ducks that swim on the surface and feed by 'upending' themselves). Such aquatic birds rely on the shallow depths for wading and feeding.
2. Dredging stirs up the fine (and sometimes toxic) sediments, and releases the highly organic material tied-up in the sediments. The release of high BOD sediments may reduce the available oxygen quickly, resulting in possible eutrophication and rapid die-off of aquatic organisms. Dredging will likely result in foul odors as hydrogen sulfide is released.
3. Dredging will have longer-term effects as well through the release of fine sediments which, especially in the case of marina development, are likely to be easily resuspended (e.g., through propeller wash), causing elevated turbidity levels for years or decades to come.

4. Creating an artificial channel to the sea will permanently alter the species composition of aquatic organisms and the pond's overall value as unique habitat for certain aquatic birds; salinity and temperature differentials may adversely affect the adjacent marine environment as well.
5. Construction of a channel will likely alter longshore sediment transport patterns, possibly accelerating shoreline erosion and/or necessitating the need for continual maintenance dredging to remove depositional sediments.
6. Flooding a salt pond with additional fresh water will similarly alter species composition, and may kill off halophilic algae, insects, etc., resulting in the release of bad odors.
7. The increased weight of the water column, as a result of flooding, may result in the extrusion of (toxic) sediments at certain points, with potential impacts on adjacent habitat.

### **3.3.5 Impacts to Cultural Resources**

Presently, the cultural resources of the area are not adequately managed or protected. Because of its coastal location, the Aklis site is vulnerable to wind and wave action. Pottery shards are easily found along the beach area, but are often collected by the general public and never recorded.

There have been several recent attempts by USFWS, NPS, and DPNR/DAHP to monitor and protect the site both from vandalism and from undisciplined archaeologists. The majority of the Aklis site is on federal land managed by the USFWS. These resources are protected by the federal Archaeological Resources Protection Act (ARPA) of 1979 (P.L. 96-95). Under provisions of this Act, removing artifacts from federal lands, or willfully damaging cultural resources on federal lands, is a federal offense, punishable by a minimum fine of \$10,000 and imprisonment of up to one year. Additional offenses can lead to fines of up to \$100,000.

Damage to the inland fringes of the Aklis site have occurred as a result of uncontrolled land clearing that was conducted without required CZM permits. Although Stop Work orders were issued, much damage had already occurred.

The Sandy Point prehistoric site presently is not threatened by vandalism. However, changes in the water level of the salt pond would likely affect the integrity of the site.

## **4. MANAGEMENT RECOMMENDATIONS**

### **4.1 Policy Framework**

Sandy Point is one of the few natural areas on St. Croix that remains virtually undeveloped. It is of both national and international interest, as efforts to protect nesting Leatherbacks at Sandy Point have been extensive, widely reported, and extremely important in the overall effort to protect this highly endangered species. These conservation efforts have not gone unnoticed by neighboring countries in the region.

The Territory has attracted the attention and action of the U.S. Congress to purchase a portion of Sandy Point peninsula to create the National Wildlife Refuge. The St. Croix community and V.I. Government officials should work together to maintain the integrity of the site and its adjacent lands and waters so that the refuge can become truly a protected refuge for the nesting sea turtles and other endangered species which have come to depend on this remaining vestige of critical habitat. In this regard, and although the U.S. Fish and Wildlife Service needs some prodding by the V.I. community to make good on its own responsibilities in managing the refuge, current and future pressures to develop the peninsula should be given extra careful and thoughtful review. The APC boundary should be seen as a necessary "buffer zone" within which development should be strictly controlled.

Suggestions that the smell of the pond indicates an unsafe, contaminated condition are largely unfounded. We know that salt ponds are, even in their most natural state, often the source of unpleasant odors or oddly colored waters. A wholly natural phenomenon, the biological degradation of organic material often results in foul smells, which can be exacerbated following die-offs associated with heavy rain (section 2.3.3). The question of whether or not an opening to the sea would significantly improve water quality within the Westend Salt Pond remains a debatable one, but aside from "improved" water quality (i.e., improved for humans), such opening would bring about predictable changes to the ecology of the pond (section 3.3.4).

The Westend Salt Pond is the largest salt pond in the Virgin Islands and has many important functions as a wetland area. Wetlands comprise 2-3% of the total land area of St. Croix and perform a number of socioeconomic and ecological functions (Gieben, 1989). The pond provides a storage area for floodwaters and habitat for plant and animal species, including several endangered species. It also serves to maintain, at a location closer to the sea, the interface between saline and fresh groundwater, thus allowing for a potentially larger freshwater "lens". The vegetation which surrounds the pond helps to reduce erosion along the coast, an important function for Sandy Point's dynamic beach environment.

Mangroves filter sediment, silt, and pollutants which settle out in the pond rather than being washed directly into adjacent marine waters. These "free ecological services" should not be discounted when consideration is given to the benefits/costs of modifying this critical habitat.

The Westend Salt Pond should remain in its natural state in order to protect habitat for a wide range of salt pond associated species and for wading birds. This will also help protect the activities of nesting turtles on adjacent beaches. Development of the Westend Salt Pond as a marina should be prohibited. Intensive development in the vicinity of the salt pond should likewise be prohibited. The following is a list of potential impacts on the pond and associated wildlife using the proposed Westend Salt Pond development as an example:

1. toxic effects from copper/tributyltin contaminants from bottom paints used on boats entering the marina;
2. net loss of wetland area, and need for compensatory mitigation elsewhere or on-site;
3. alteration of longshore sand transport patterns, and likelihood of increasing coastal erosion adjacent to protective breakwaters;
4. long-term dynamics of Sandy Point peninsula and increased likelihood of significant sea level rise in the next few decades;

5. further alteration of hydrologic patterns as a result of new land developments; effects of hydrological changes on the pond's already hypersaline condition (itself a result of past hydrological disruptions from land development);
6. soil compaction of adjacent lands through the use of heavy equipment; associated habitat loss;
7. effects of increased traffic and noise on wildlife utilizing the pond;
8. effects of increased artificial light in the area on emerging turtle hatchlings, including the possibility that an increased amount of artificial light from, say a condominium development, could well precipitate mass mortalities of hatchlings with possibly serious impact on the viability of the stock (Island Resources Foundation, 1978);
9. excessive sedimentation in the salt pond due to land clearing and potentially inadequate erosion control practices;
10. influx of nutrients and chemicals to the pond from landscaping associated with the new development.

Title 12, Chapter 21, Section 906 of the V.I. Code states that a policy for the first tier of the coastal zone is to "conserve significant natural areas for their contributions to marine productivity and value as habitats for endangered species and other wildlife". This policy should be strictly interpreted and applied for the Sandy Point peninsula in order to protect the critical habitat which it harbors.

The northern portion of the Westend Salt Pond is also included in the Coastal Barrier Resources System (Figure 4), approved by the U.S. Congress in legislation which went into effect on November 16, 1990 (Section 1.4). The Coastal Barrier Resources Act of 1982 (amended 1990), recognizes that coastal barriers provide:

1. (A) habitats for aquatic birds and other wildlife; and (B) habitats which are essential spawning, nursery, nesting, and feeding areas for commercially and recreationally important species of finfish and shellfish as well as other aquatic organisms such as sea turtles.

The act further states that:

2. coastal barriers contain resources of extraordinary importance which are being irretrievably damaged and lost due to development on, among, and adjacent to, such barriers;
3. coastal barriers serve as natural storm protective buffers and are generally unsuitable for development;
4. certain actions and programs of the Federal Government have subsidized and permitted development on coastal barriers and the result has been the loss of barrier resources, threats to human life, health, and property, and the expenditure of millions of tax dollars each year; and
5. a program of coordinated action by Federal, State, and local governments is critical to the more appropriate use and conservation of coastal barriers.

"No net loss" of wetlands is both federal and territorial policy. Federal policy is implemented through the Section 404 permitting process administered by the U.S. Army Corps of Engineers. A closer working relationship between the V.I. Government and the Federal agencies (especially the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service) would be beneficial in the understanding and consistent application of such policy.

The most significant Federal agency involved in the management of Sandy Point peninsula and the Westend Salt Pond is the U.S. Fish and Wildlife Service. The Sandy Point National Wildlife Refuge could and should be a proud showcase for both the Service and the people of the Virgin Islands. Unfortunately, budgetary constraints and inadequate management have resulted in a refuge that falls short of its goals of wildlife protection and public enjoyment and education. Official contact with the Service at its highest level should be made in order to learn exactly what investment and management improvements it intends to make at the refuge. Of foremost concern is the issue of inadequate security for refuge visitors.

The National Wildlife Refuge has been without a Refuge Manager since October 1992. A new Refuge Manager has been recruited and will undergo Law Enforcement Training before starting his new post on St. Croix during the second half of 1993 (pers. comm., S. Rice, USFWS). Future objectives for the National Wildlife Refuge include the following (USFWS, 1992):

1. Request that the federal government bring Sandy Point National Wildlife Refuge on line as a fully functional refuge;
2. Increase community and public support for the resource management and environmental education programs at the Refuge;
3. Enhance the Refuge's resource management and law enforcement capabilities;
4. Make necessary improvements to the physical infrastructure at the refuge, including restrictions to Off Road Vehicles, centralization of parking, closure of beach access road cuts, construction of a kiosk, visitors' check-in hut at the refuge entrance, administrative office, interpretative signage, etc.
5. Inform and educate the public about the National Wildlife Refuge System and its role in protecting endangered species and the nation's other wildlife resources; and
6. Better manage the cultural, historical, and archaeological resources of the Refuge.

Several issues/suggestions regarding needed improvements at the Refuge:

1. Because of the ongoing research projects and educational programs at Sandy Point, additional support staff is needed for the refuge. Law enforcement alone is a full-time job and, when added to the many additional duties of the Refuge Manager, cannot be effectively accomplished by one person.

2. In order to alert and educate the public about the refuge and the endangered habitats which it supports, kiosks should be constructed, and entrance, interpretive, regulatory, and traffic flow signs need to be put in place.
3. The main access road into the refuge needs to be improved. One centralized parking area should be created near the swimming beach. All other illegal roads, parking areas, and campsites should be permanently barricaded and closed.
4. USFWS should ensure that there is a Refuge Manager on-site at all times who enforces the provisions of the Archaeological Resources Protection Act (ARPA). Under provisions of the National Historic Preservation Act of 1966 (P.L. 89-665, as amended), and under Executive Order 11593, the USFWS is responsible for the protection of cultural resources under its jurisdiction. The agency is also responsible for surveying its lands and inventorying its cultural resources.
5. Better management, maintenance, and enforcement at the refuge will decrease potential threats to the endangered habitats of Sandy Point.
6. There is a need to increase public awareness and education about the refuge through brochures, posters, and school programs.
7. Lights from the town of Frederiksted and/or from the Hess Oil Refinery have been reported to disorient emerging turtle hatchlings (Island Resources Foundation, 1978). This should be further explored and remedial actions determined. New developments should be restricted to the following lighting criteria: *Artificial lighting in the proximity of nesting beaches should be "turtle sensitive", that is, only low-pressure, long wavelength, sodium-vapor lamps (of either high or low intensity) should be allowed, and they should always be shielded to direct illumination away from turtle nesting areas.*
8. Law enforcement in the refuge and surrounding areas must be increased. Fines should be issued to violators of regulations concerning vehicles, trash, after-hour visitors, bonfires, horses, etc. Moreover, the high level of crime in the area directly affects visitor safety. The issue of law enforcement within the refuge should be seen as one involving the wider community.

#### **4.2 Planning and Permitting**

The majority of the Sandy Point peninsula, including all of Westend Salt Pond is currently zoned W-1, Waterfront Pleasure (Figure 5). Parcels east of the salt pond, from a line drawn parallel to the pond, are zoned R-2, Residential (Low Density). Permitted uses for these zones can be found in the V.I. Code, Title 29, Chapter 3, Section 228.

In the early 1980's, DPNR/CZMP prepared and adopted the Coastal Land and Water Use Plan (CLWUP), which designates all coastal areas of the Territory as one of ten (10) classifications. The CLWUP designations were, in some locations, in conflict with the existing zoning designations. For example, the W-1 designation under the existing zoning code (Figure 5), was re-designated as

"residential, medium-density" under the CLWUP. This would have allowed more intensive commercial development than that which is allowed under the existing (W-1) zoning. Both the W-1 designation and the "residential, medium-density" designation would allow development that is inconsistent with the goals of natural area management and preservation.

Since the late 1980's, DPNR/Comprehensive Planning staff have worked to prepare a Comprehensive Land and Water Use Plan that will re-designate all land and water in the Territory as one of ten (10) new designations, known as "Intensity Districts". The goal of the Comprehensive Plans is to ensure that the quality of life for island residents is maximized.

### Natural Hazards Mitigation

There is a need in the Territory for an effective coastal storm hazard mitigation policy and plan. The siting of facilities along the coast increases a cumulative threat potential with respect to three types of coastal storm impacts: (1) threats to public health, safety, and welfare; (2) costs to tax payers for disaster relief and protection; and (3) losses of irreplaceable natural resources (Godschalk, *et al.*, 1989). Compounding the potential for catastrophic losses due to coastal storms is the possibility of significant sea level rise (SLR) in the decades ahead.

While average SLR over the last century has been less than one-foot (10-15 cm), an increase in that much or more (10-20 cm) is projected by 2025, and of between 1.5 and 6.5 feet (50-200 cm) by the year 2100. Using an average of 1 meter of shoreline erosion per cm of SLR, the resulting average by 2025 would be 33 to 66 feet (10-20 meters) [Godschalk, *et al.*, 1989].

There are generally three strategies that may be adopted to mitigate coastal storm hazards and SLR impacts. First, the natural coastline can be "hardened" by using designed protective structures, such as bulkheads, revetments, gabions, etc.. Second, facilities and structures built in high hazard areas can also be hardened through the use of stricter building standards to achieve increased wind and/or flooding resistance. These strategies often require resorting to and preparing for evacuation of people during a storm event, with its incumbent risk to human life. Third, and a better approach, coastal development can be directed or redirected away from high hazard areas through the use of shoreline setback standards and/or re-zoning of high hazard areas to achieve simultaneous risk reduction and other objectives such as open space preservation or wildlife management.

This "development management" strategy, is generally the most cost effective option. As with the use of stricter building codes, increased costs associated with the alteration of land use patterns to reduce the exposure of people and property to storm damage are offset by long-term savings (from less damage) and reduced insurance rates. It is always (politically) easier to add a hazard mitigation section to an existing plan, regulation, or program than it is to adopt a totally new set of tools. In fact, there is no better time than today to prepare for the next storm, by introducing legislation that will require the use of new guidelines for decision-making during the next rebuilding effort.

A coastal storm hazard mitigation policy and regulations should be developed for the Territory, and for the Sandy Point peninsula on a site-specific basis. A "development management" alternative to hazard mitigation is recommended, and will require that implementing legislation be enacted soon in preparation for the next disaster. Future public and private developments should be directed away

from high hazard areas. Redevelopment policies should be considered for existing shoreline development to minimize potential losses, and to establish a reconstruction plan prior to its need.

As seen above (section 2.3.2), earthquake potential in the Territory is relatively high. Where landfilled areas are to be used for construction, logic suggests that certain compaction standards be adhered to and a certified engineers report should be required for all major facilities.

Appropriate attention should be given the design of major facilities, especially those which will house large assemblies of people, so that threats from seismic activity are absolutely minimized.

Flooding mitigation will be a concern for existing and new developments in the APC. As mentioned above (section 2.3.3), FEMA/NFIP A-Zone and V-Zone floodplains exist throughout the area.

Strict adherence to National Flood Insurance Program policies and regulations is recommended, and new developments restricted where the hydrology and flooding potential of an area may adversely affect important wildlife habitat or other natural features. Channelization for flood control should be avoided wherever possible, and new developments directed away from floodplain hazard areas. Cumulative impacts from the increased use of non-porous surface materials should be assessed, and guidelines established for the use of "grassphalt" and other porous surface materials on access roads, parking lots, and other suitable areas. Regular maintenance of all drainage systems, and an assessment of proper sizing of culverts, should be integral to a program of stormwater management for the APC.

#### Water

There is currently few places for the public to dispose of waste oil in the Territory, and so it is often disposed of on the land (rather than kept in sealed containers as is the official interim guideline). With such practice, waste oil becomes entrained in runoff water and ultimately discharged to salt ponds and/or the marine environment.

*The strictest enforcement actions and penalties should be instituted for persons caught illegally disposing of waste oil. Such actions should be undertaken in concert with a public awareness program on the environmental effects of improperly disposed oil.*

A well designed and targeted Water Quality Monitoring (WQM) program is essential if territorial Water Quality Standards are to be met, and if specific management actions are to be undertaken in response to degraded water quality. Although DPNR has intermittently monitored water quality for over fifteen years, the data collected is largely not used to make management decisions. This is in part due to the lack of an Action Plan in the event that violations of Water Quality Standards occur (USVI Govt/DPNR, 1992).

Moreover, routine monitoring of the biological resources (e.g., submerged aquatic vegetation, benthic invertebrate communities, corals, mangroves, etc.) in the Territory's coastal waters is not performed (USVI Govt/DPNR, 1992). *Biological monitoring can provide valuable information on the health of the environment, and should be incorporated into an improved WQM program with adequate funding and achievable goals for targeted areas.*



In April 1988, the USEPA conducted a toxicity test on effluent discharged at the site of the Virgin Islands Rum Industries Limited (VIRIL) outfall at Estate Betty's Hope, approximately three miles upcurrent from Sandy Point peninsula along the island's southshore. They concluded that the VIRIL effluent is extremely toxic (with a 96-hour LC50 value of 0.74 percent by volume). An analysis (by heavy metal scan) of thirteen metals showed elevated concentrations of arsenic, copper, and zinc. They noted that the concentrations of these metals singularly or together have the potential to cause serious and chronic water quality impacts on the receiving waters (Oland, 1992). Assessments completed by the USFWS indicate that the rum effluent, in addition to being toxic to marine organisms near the outfall, have the potential to affect nesting sea turtles down current at the Sandy Point APC (Oland, 1992). Although it is believed that the plume extends from the discharge point to Sandy Point with little mixing or dispersion, the hypothesis that the plume affects nesting sea turtles at Sandy Point has not been scientifically confirmed. Future water quality monitoring efforts should include sampling stations on the peninsula's southeast side, to monitor effects of effluent discharged from the VIRIL outfall.

### **Biological Resources**

To minimize disturbance to turtle nests, the exercising of horses on the beach should be prohibited except on the stretch of beach between the fishing dock in Frederiksted and the Vincent Mason Recreational Complex. (Little or no turtle nesting occurs along this stretch of beach.)

Although road access to the beach is desirable to some people, the noise and other disturbances associated with vehicular traffic interfere with sea turtle and bird nesting, and enjoyment of the area for some human visitors. All vehicular beach access roads should be closed; only the primary entrance/exit road to the refuge should be made available to visitors.

Driving along the beach at Sandy Point (and other beaches in the Virgin Islands) should be entirely prohibited. Vehicular traffic damages beach, dune, and berm vegetation, possibly reducing the storm protection capabilities of the beach berm system. Driving along the beach also disrupts sea turtle and bird nesting.

Any developments which would physically modify the natural configuration of the Westend Salt Pond should be subject to a thorough environmental assessment process and review. Regardless of ownership (section 2.2), the salt pond should be viewed as what it is: a single, integral waterbody providing critical habitat for aquatic birds and physical protection for adjacent marine critical habitat.

### **Cultural Resources**

In the event that cultural sites are to be removed or damaged as a component of a proposed development, mitigation measures should be designed and fully enforced, and should include the requirement for a qualified archaeologist or historian (as appropriate) to direct such mitigation and/or data recovery efforts.

## **4.3 Legislative Change**

As seen in section 2.2, ownership disputes concerning salt ponds are not uncommon in the Territory. A written legal opinion by the Attorney General's Office was needed to decide the fate of a proposed development of the Red Hook Salt Pond on St. Thomas. That opinion (section 2.2) found that the Red Hook pond was indeed tidally influenced, and therefore subject to the 1974 Submerged and Tidal Lands Act which transferred such lands to the V.I. Government. The legal opinion, while providing an important legal precedent, did not provide comment on other salt ponds in the Territory. And although the Westend Salt Pond has been found by various sources (e.g., USFWS; DPNR/DFW) to be tidally influenced, a specific legal opinion regarding ownership of the northern portion of the pond does not yet exist.

It is recommended that the Legislature examine the Submerged and Tidal Lands law as it relates to salt ponds, and/or it should reexamine Title 12, Chapter 21 of the V.I. Code to *further define* and explicitly include salt ponds and suitable buffer zones as needed protected habitat.

#### 4.4 Institutional Development

As seen above, the National Wildlife Refuge has been understaffed and underfunded for a number of years. The Refuge has suffered as a result, with damage to both its natural and cultural resources, not to mention its national and international reputation. Personal security for visitors is lacking at this public, federally funded facility.

With recognition that the a collaborative effort to conduct mitigative data recovery at the Aklis site are already underway (section 4.2), the V.I Government should approach the USFWS with the suggestion that the Service consider joining forces with the National Park Service on other aspects of the Refuge's operation and maintenance. Security and law enforcement, cultural resource protection and interpretation, and possibly kiosk operations are a few examples of where a collaborative arrangement would greatly assist the single Refuge Manager. The Manager must otherwise either leave such necessities undone, or spread himself too thin in trying to tackle everything. The Service should honor its commitment to the people of the Virgin Islands to administer a well-managed refuge. Such a collaborative arrangement with the NPS would re-instill public faith that the federal government is willing to explore all avenues to provide effective management of the Refuge in these times of budgetary austerity that the Service is currently going through.

### 5. CONCLUSION

Within the Sandy Point APC are located the largest salt pond (Westend Salt Pond) and the longest stretch of beaches in the Virgin Islands. The beaches are traditionally important recreational areas and important nesting sites for three species of federally listed endangered sea turtles. Sandy Point is one of only thirteen known regularly used Leatherback sea turtle nesting sites in the world, and is the largest such site in the United States and its Territories. The U.S. Fish and Wildlife Service administers the Sandy Point National Wildlife Refuge, encompassed within the APC boundaries.

Sandy Point provides an exceptional setting for many different scientific, educational, recreational, and cultural opportunities. In addition to its international status as a primary Leatherback nesting site, the diverse plant and animal species found at Sandy Point include several that are federally and/or territorial listed as endangered or threatened. The large salt pond is important habitat for aquatic birds

during their annual migrations between North and South America. Moreover, the mix of flora and fauna found at Sandy Point is unique and largely undisturbed by development. One of the most fascinating archaeological sites on St. Croix -- the Aklis site -- exists within the National Wildlife Refuge. However, natural and cultural resources within the Refuge continue to be degraded as a result of inadequate visitor control. In this regard, the V.I. Government should encourage the U.S. Fish and Wildlife Service to place greater emphasis on resource protection and law enforcement within the National Wildlife Refuge and, for its own part, resolve to achieve similar management objectives within the entire APC.

Resource utilization within the APC should be governed by the need to preserve the ecological integrity of the area and its major feature, the Westend Salt Pond. Any proposed development that would threaten the ecological integrity of the Salt Pond, the turtle nesting beaches, or the nearshore marine environment, should be strictly restricted. In short, the Sandy Point APC should continue to be the focus of efforts to protect, restore, and enhance the area's many valuable biological, physical, and cultural resources for present and future generations of Virgin Islanders.

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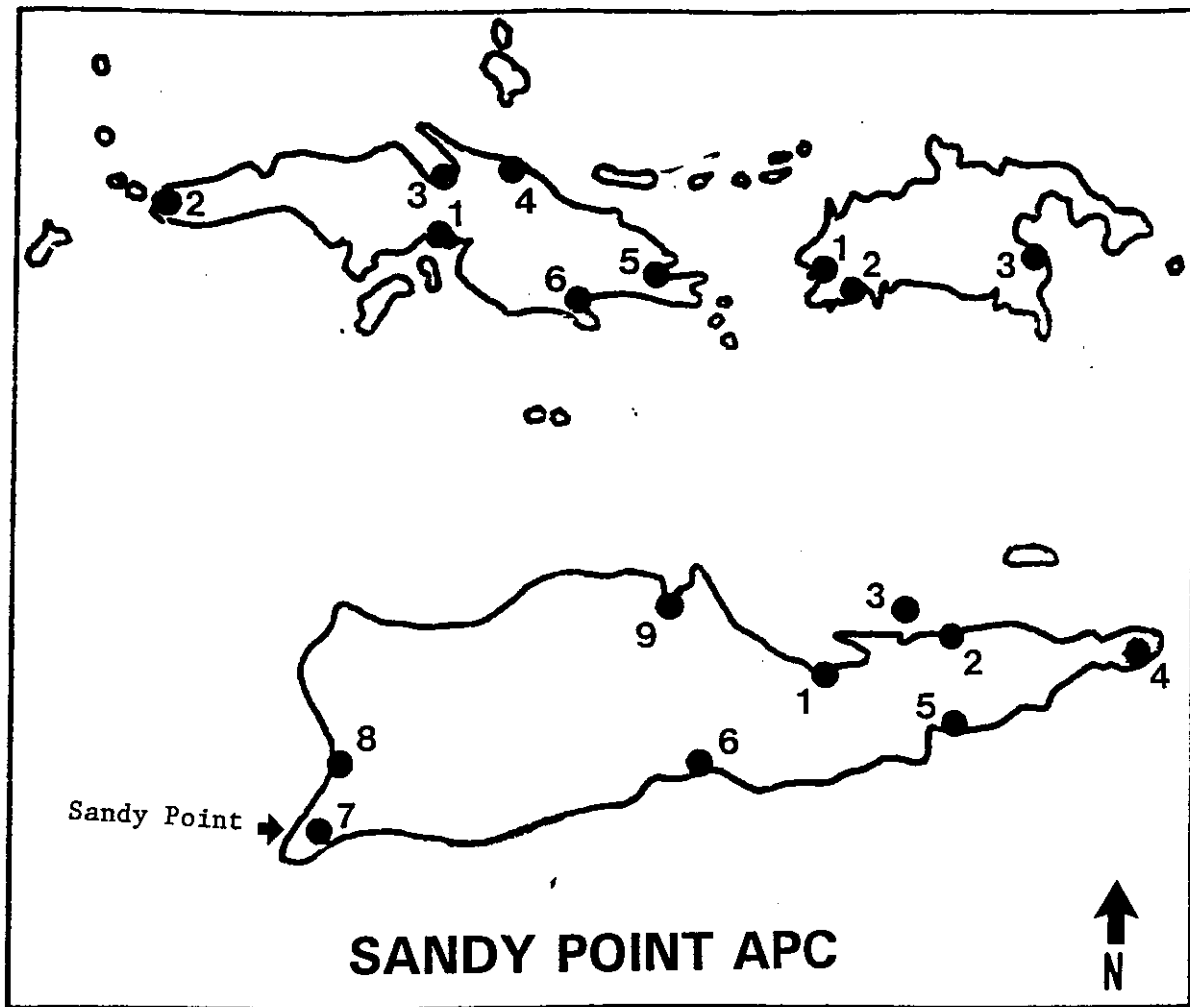
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**AREAS OF PARTICULAR CONCERN**



**AREAS OF PARTICULAR CONCERN**

**St. Thomas**

- 1) St. Thomas Harbor and Waterfront
- 2) Botany Bay (APR)
- 3) Magens Bay and Watershed
- 4) Mandahl Bay (APR)
- 5) Vessup Bay - East End
- 6) Mangrove Lagoon - Benner Bay (APR)

**St. John**

- 1) Enighed Pond - Cruz Bay
- 2) Chocolate Hole - Great Cruz Bay (APR)
- 3) Coral Bay (APR)

**St. Croix**

- 1) Christiansted Waterfront
- 2) Southgate Pond - Chenay Bay (APR)
- 3) St. Croix Coral Reef System (APR)
- 4) East End (APR)
- 5) Great Pond and Great Pond Bay (APR)
- 6) Southshore Industrial Area
- 7) Sandy Point
- 8) Frederiksted Waterfront
- 9) Salt River Bay and Watershed (APR)

**Figure 1**  
**Regional APC Map**  
 Adapted from: USDOC, 1979

# SANDY POINT

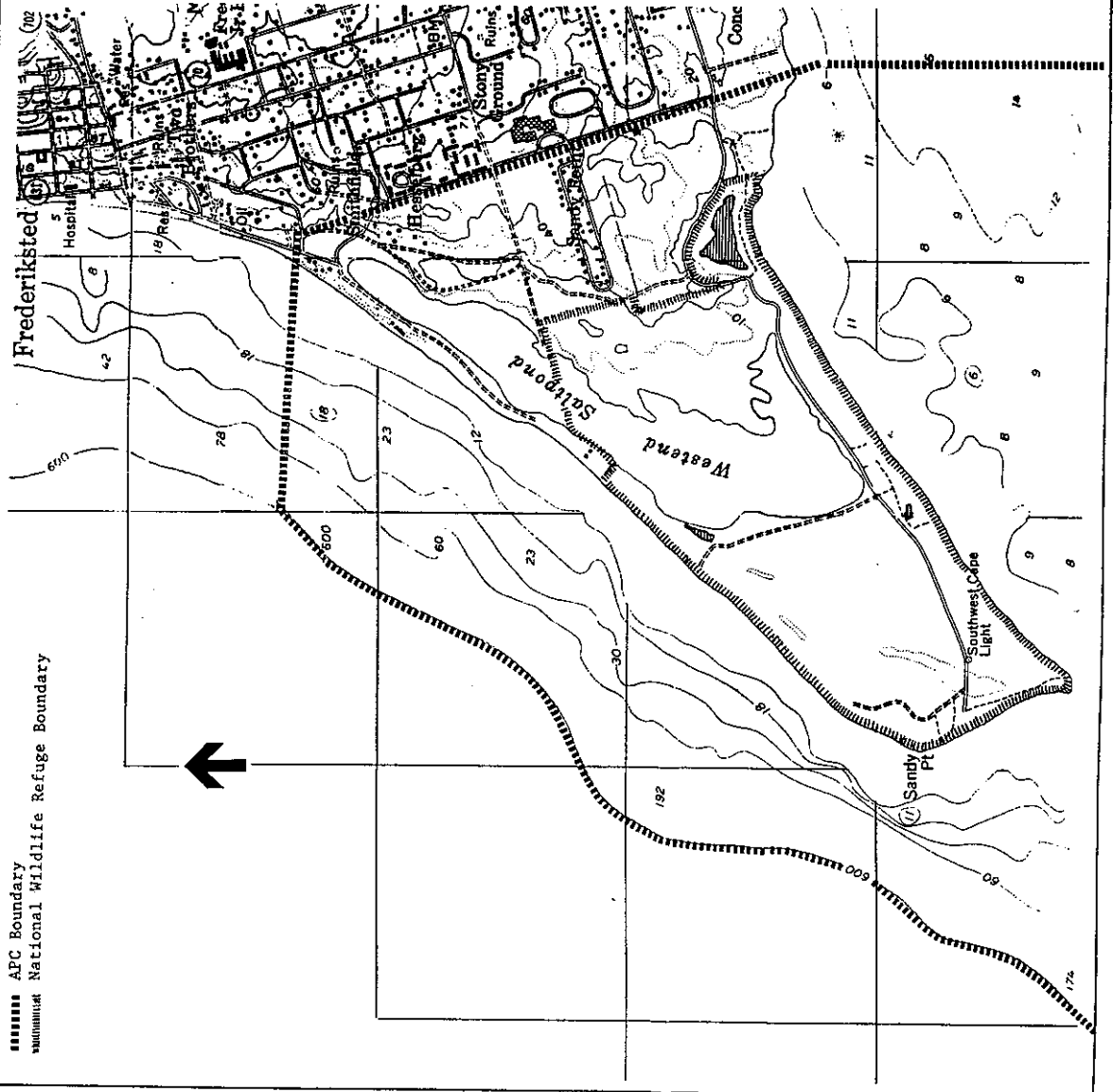
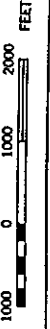
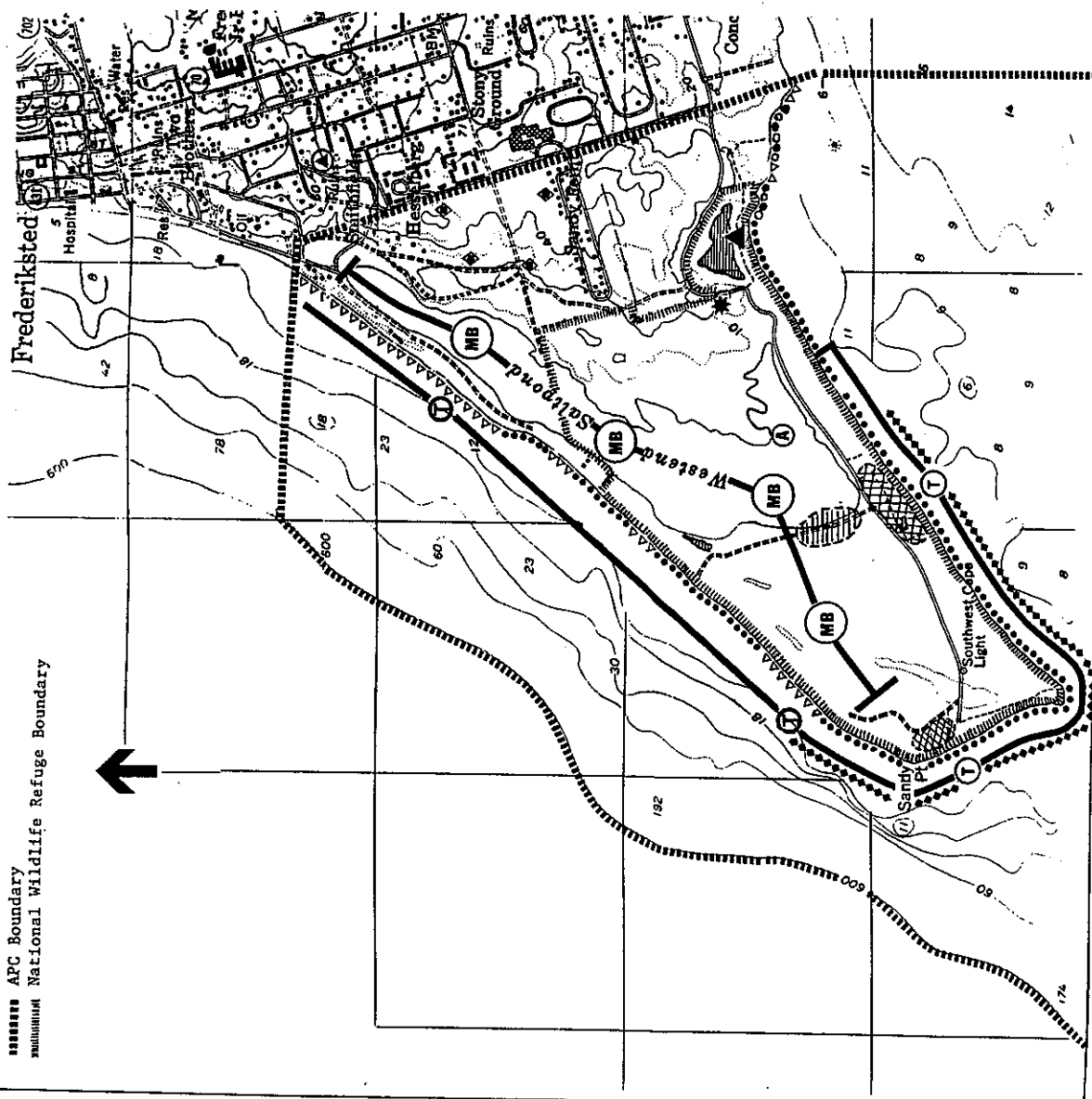


Figure 2  
APC Boundary Map  
Base map adapted from: USGS, 1982  
Island Resources Foundation, 1993





# SANDY POINT

## PHYSICAL, BIOLOGICAL AND CULTURAL RESOURCES

### Physical Resources

- △△△ Exposed beach backed by fine-grained sand beaches
- Fine-grained sand beaches
- Mixed sand and gravel beaches
- Ⓐ Seaman's Point; location of rock fissure
- Former sand borrow pits
- \* National Wildlife Refuge - entrance gate

### Biological Resources

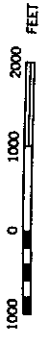
- MB Marine birds - roosting and/or nesting sites
- T Least tern nesting site
- Sea turtle nesting area (Hawksbill, Green and Leatherback)
- Nesting beach actually patrolled and studied
- Vahl's boxwood (endangered plant species)

### Cultural Resources

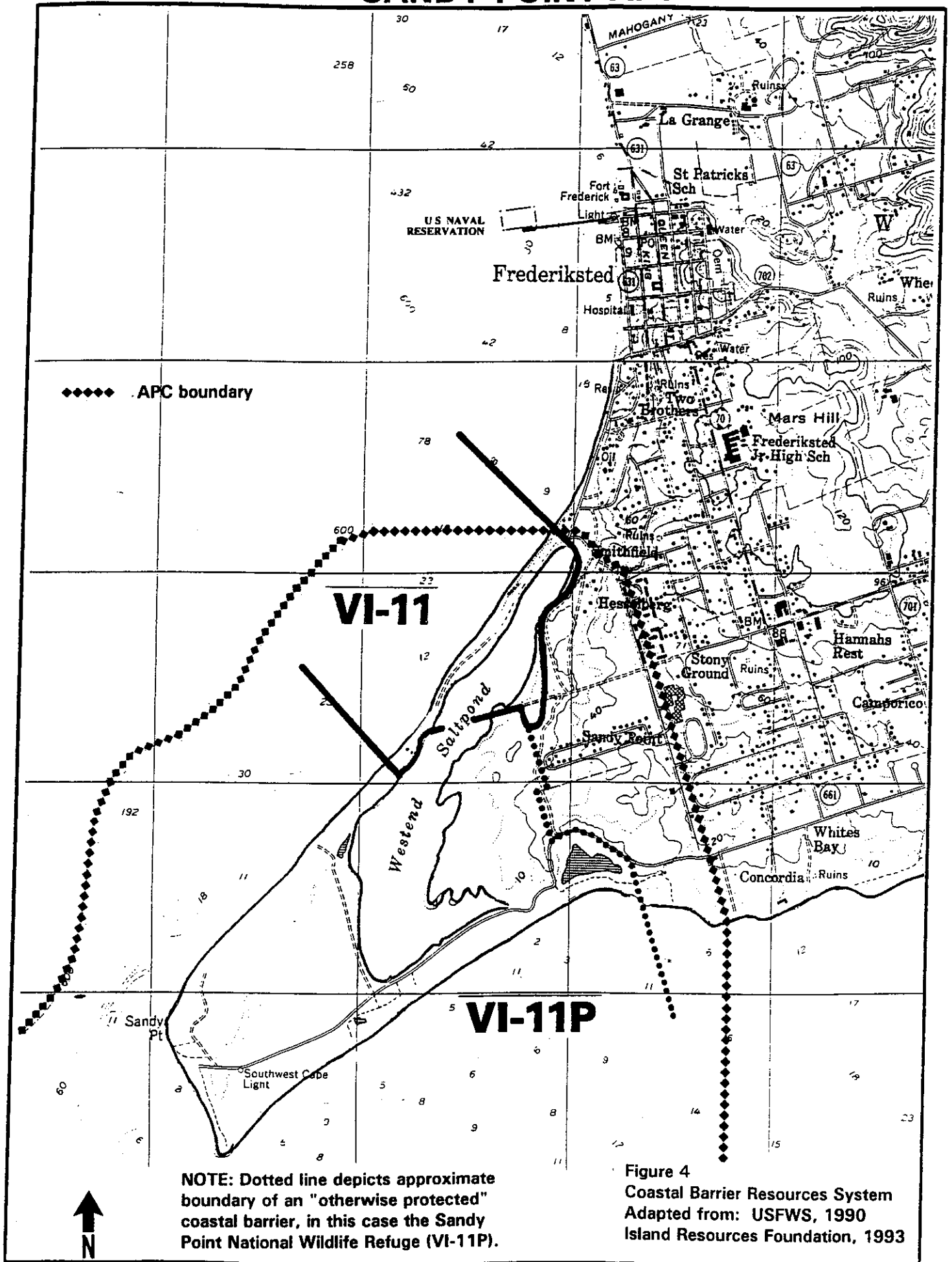
- ▲ Aklis site
- Ⓐ Smithfield historic sugar mill

APC Boundary  
 National Wildlife Refuge Boundary

Figure 3  
 Physical, Biological and Cultural Resources  
 Base map adapted from: USGS, 1982  
 Island Resources Foundation, 1993



# SANDY POINT APC



◆◆◆◆ APC boundary

**VI-11**

**VI-11P**

NOTE: Dotted line depicts approximate boundary of an "otherwise protected" coastal barrier, in this case the Sandy Point National Wildlife Refuge (VI-11P).

Figure 4  
Coastal Barrier Resources System  
Adapted from: USFWS, 1990  
Island Resources Foundation, 1993



# SANDY POINT APC

U.S. Virgin Island  
Zoning Codes

- A-1 Agricultural District
- A-2 Agricultural District
- R-1 Residence Low Density
- R-2 Residence Low Density
- R-3 Residence Medium Density
- R-4 Residence Medium Density
- R-5 Residence High Density
- B-1 Business Central Business District
- B-2 Business Secondary
- B-3 Business Scattered
- B-4 Business Residential
- C- Commercial
- I-1 Industry Heavy
- I-2 Industry Light
- W-1 Waterfront Pleasure
- W-2 Waterfront Commercial-Industrial
- P- Public

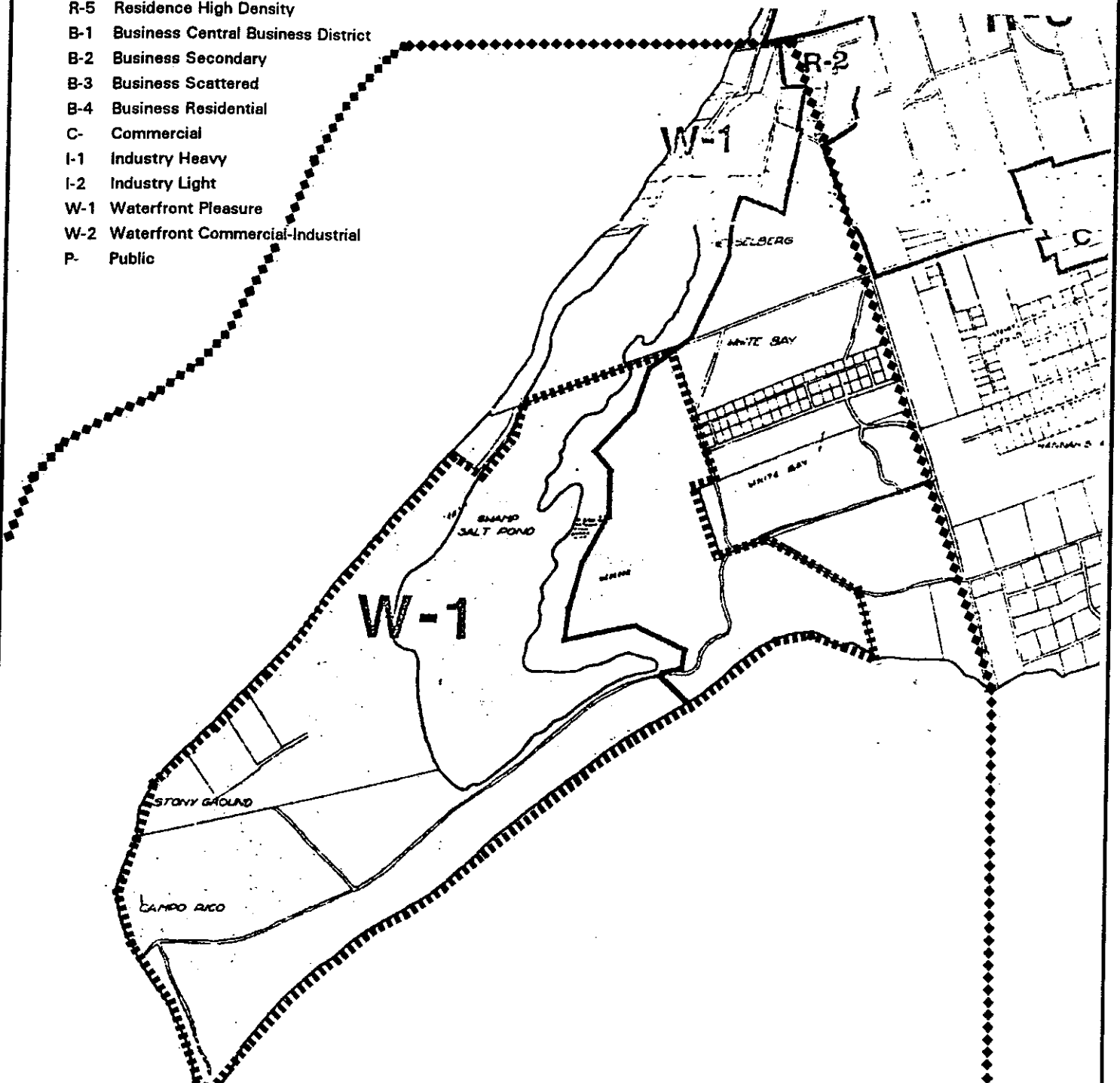
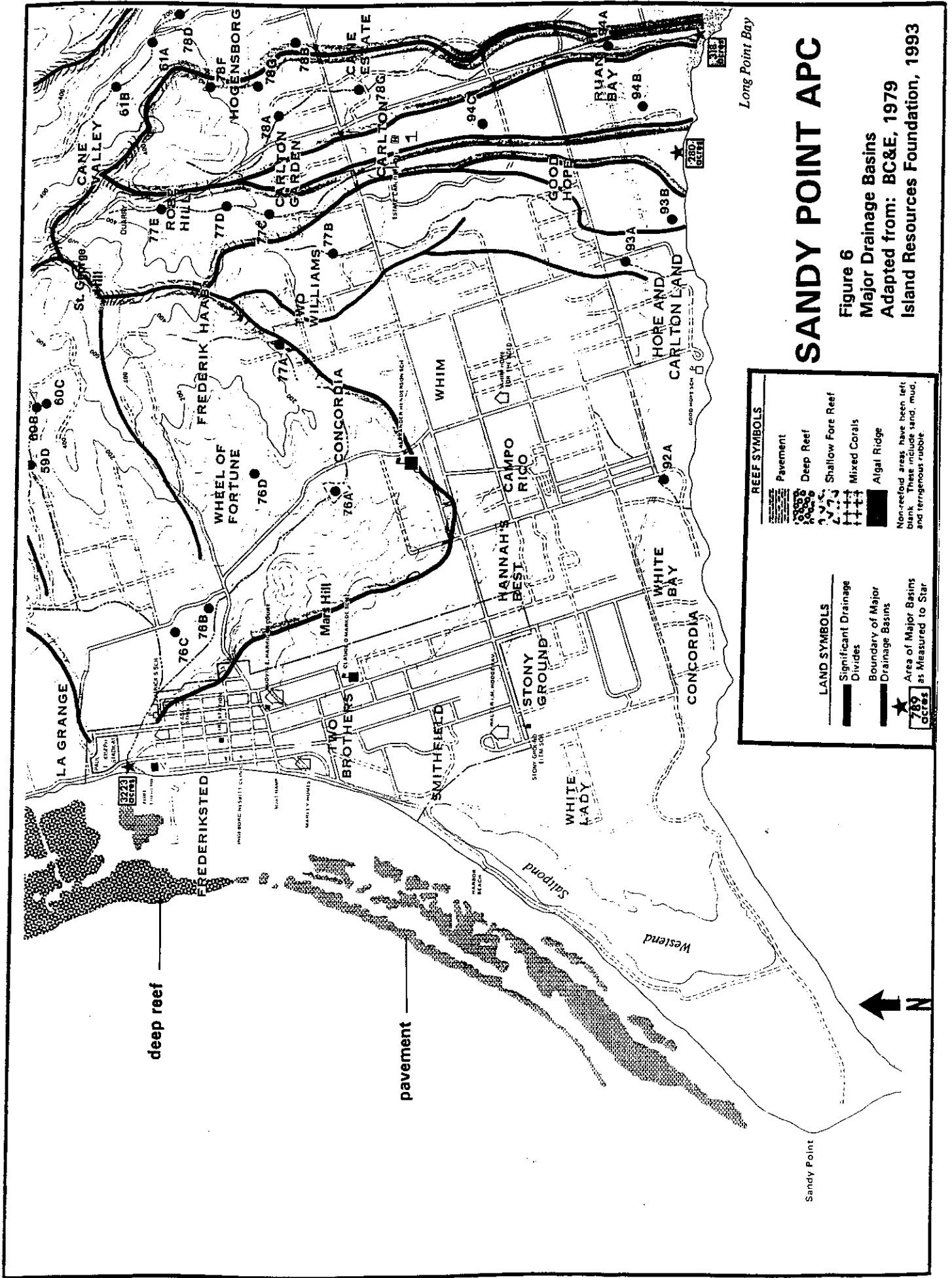


Figure 5  
Existing Zoning  
Adapted from: Real Estate  
Data Inc., 1987  
Island Resources Foundation, 1993



# SANDY POINT APC

## KEY TO MAP

500-Year Flood Boundary	
100-Year Flood Boundary	
Zone Designation*	
100-Year Flood Boundary	
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	
Base Flood Elevation in Feet Where Unbarrier Within Zone**	
Elevation Reference Mark	
Estate Boundary	
River Mile	
UNDEVELOPED COASTAL BARRIERS†	
Identified 1981	
Identified 1990	
Otherwise Protected Area	

† Coastal barrier areas are normally located within or adjacent to special flood hazard areas.  
 \*\* References to Mean Sea Level

## \*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection levees or other structures; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one square mile or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

INITIAL IDENTIFICATION:  
 FEBRUARY 25, 1977  
 111 J.D. HAZARD BOUNDARY MAP REVISION:  
 NONE  
 FLOOD INSURANCE RATE MAP EFFECTIVE:  
 OCTOBER 15, 1980  
 FLOOD INSURANCE RATE MAP REVISIONS:  
 March 18, 1987 - to add special flood hazard areas, and to change zone designations.  
 August 3, 1982 - to add undeveloped coastal barriers and otherwise protected areas.

THE ESTATE BOUNDARIES ON THIS MAP PANEL ARE FOR REFERENCE PURPOSES ONLY. THEY WERE PROVIDED BY THE DISASTER PREPAREDNESS OFFICE, CIVIL DEFENSE AND EMERGENCY SERVICES OFFICE OF THE GOVERNOR. THE LOCATION OF THE BOUNDARIES ARE APPROXIMATE WITH RESPECT TO THE CULTURE SHOWN ON THIS MAP.

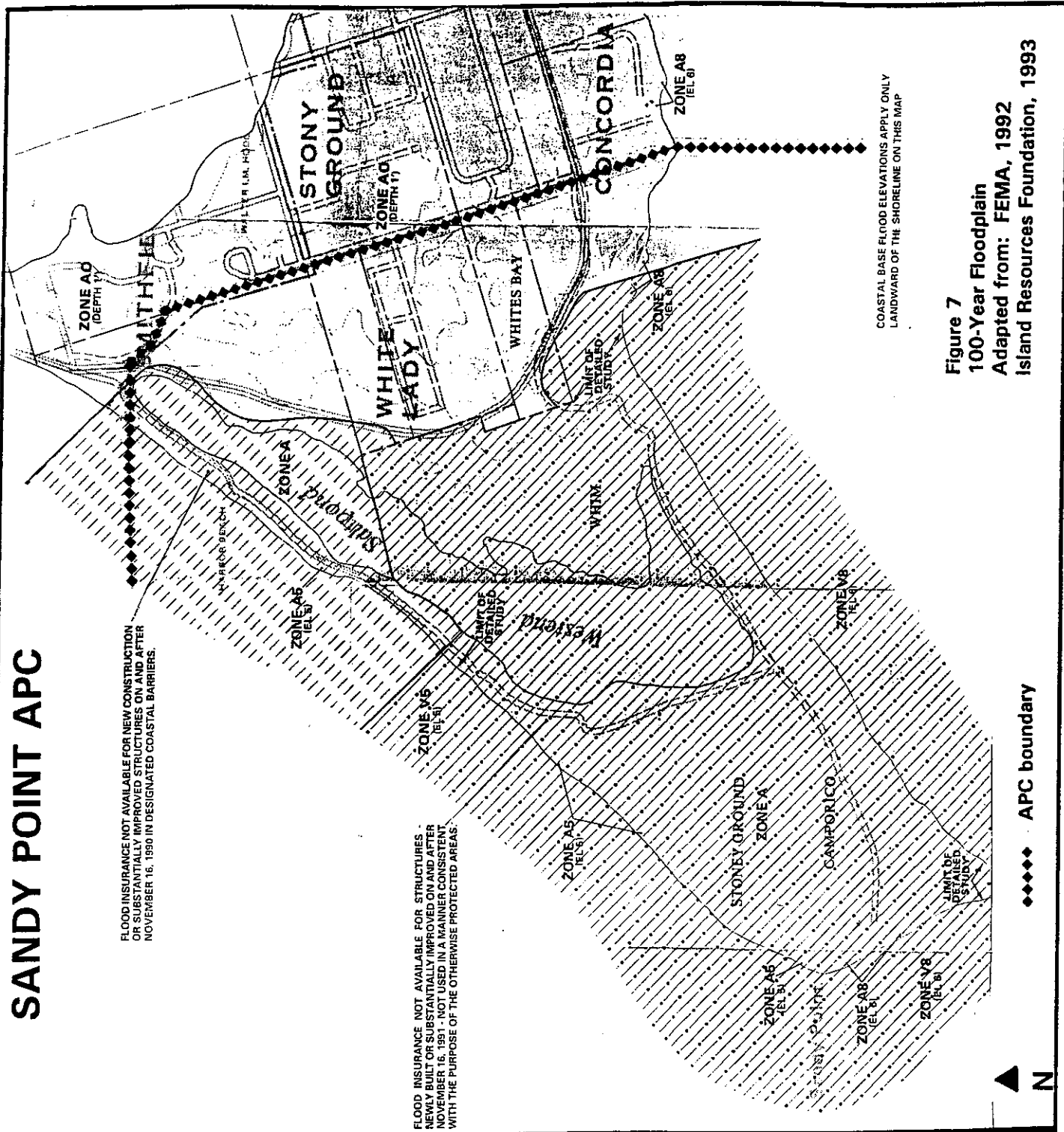
FLOOD INSURANCE NOT AVAILABLE FOR NEW CONSTRUCTION OR SUBSTANTIALLY IMPROVED STRUCTURES ON AND AFTER NOVEMBER 16, 1990 IN DESIGNATED COASTAL BARRIERS.

FLOOD INSURANCE NOT AVAILABLE FOR STRUCTURES NEWLY BUILT OR SUBSTANTIALLY IMPROVED ON AND AFTER NOVEMBER 16, 1991 - NOT USED IN A MANNER CONSISTENT WITH THE PURPOSE OF THE OTHERWISE PROTECTED AREAS.

COASTAL BASE FLOOD ELEVATIONS APPLY ONLY LANDWARD OF THE SHORELINE ON THIS MAP

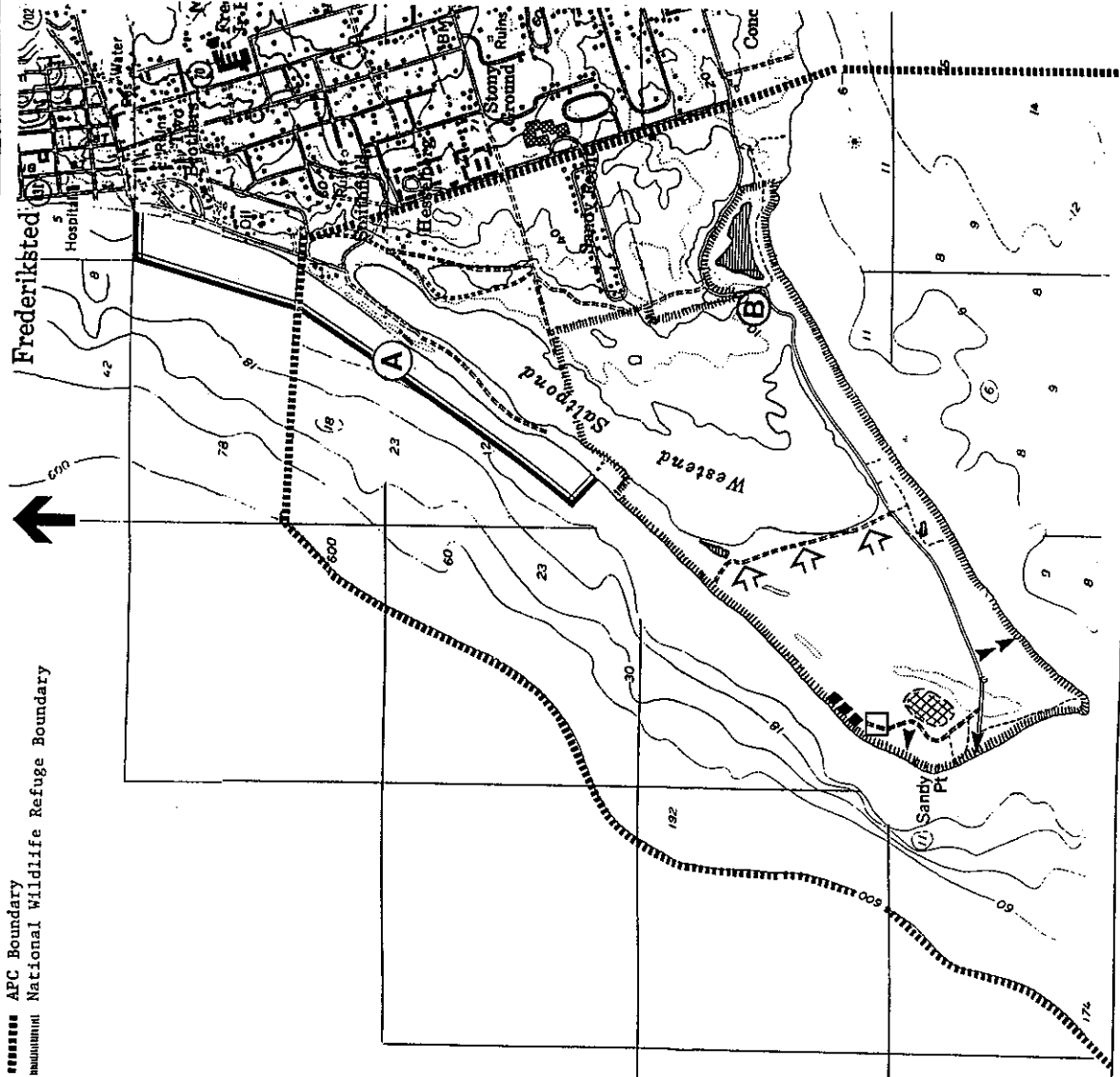
**Figure 7**  
**100-Year Floodplain**  
**Adapted from: FEMA, 1992**  
**Island Resources Foundation, 1993**

◆◆◆◆ APC boundary



# SANDY POINT

APC Boundary  
National Wildlife Refuge Boundary



## OPPORTUNITIES AND CONSTRAINTS

### Opportunities

- (A) Area recommended for exercising horses (prohibit horses on all other beaches)
- (B) Entrance check-point needed for Refuge (next to gate)
- (C) Parking consolidation needed with kiosk and interpretive information materials available
- Former camp sites (now closed with vegetation recovering)

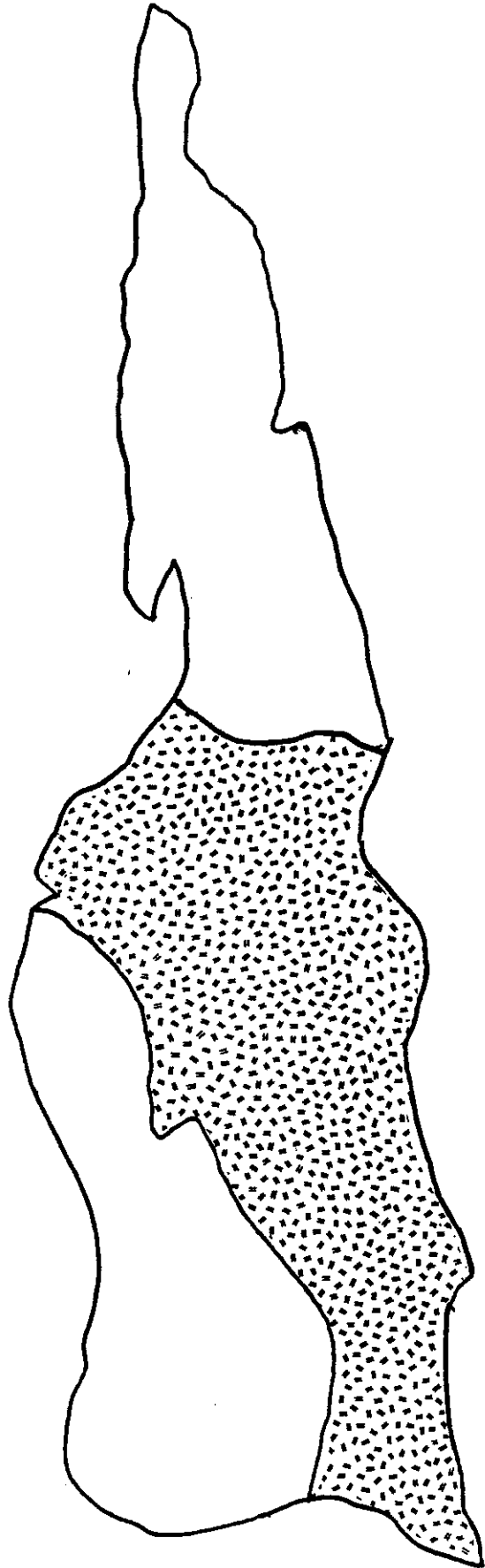
### Constraints

- Beach access road cuts; should remain closed
- Medical wastes dumped here (and later removed) following Hurricane Hugo
- Road should be kept closed; only single, main sandy road from entrance to parking area should be used

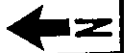
Figure 8  
Opportunities and Constraints  
Base map adapted from: USGS, 1982  
Island Resources Foundation, 1993







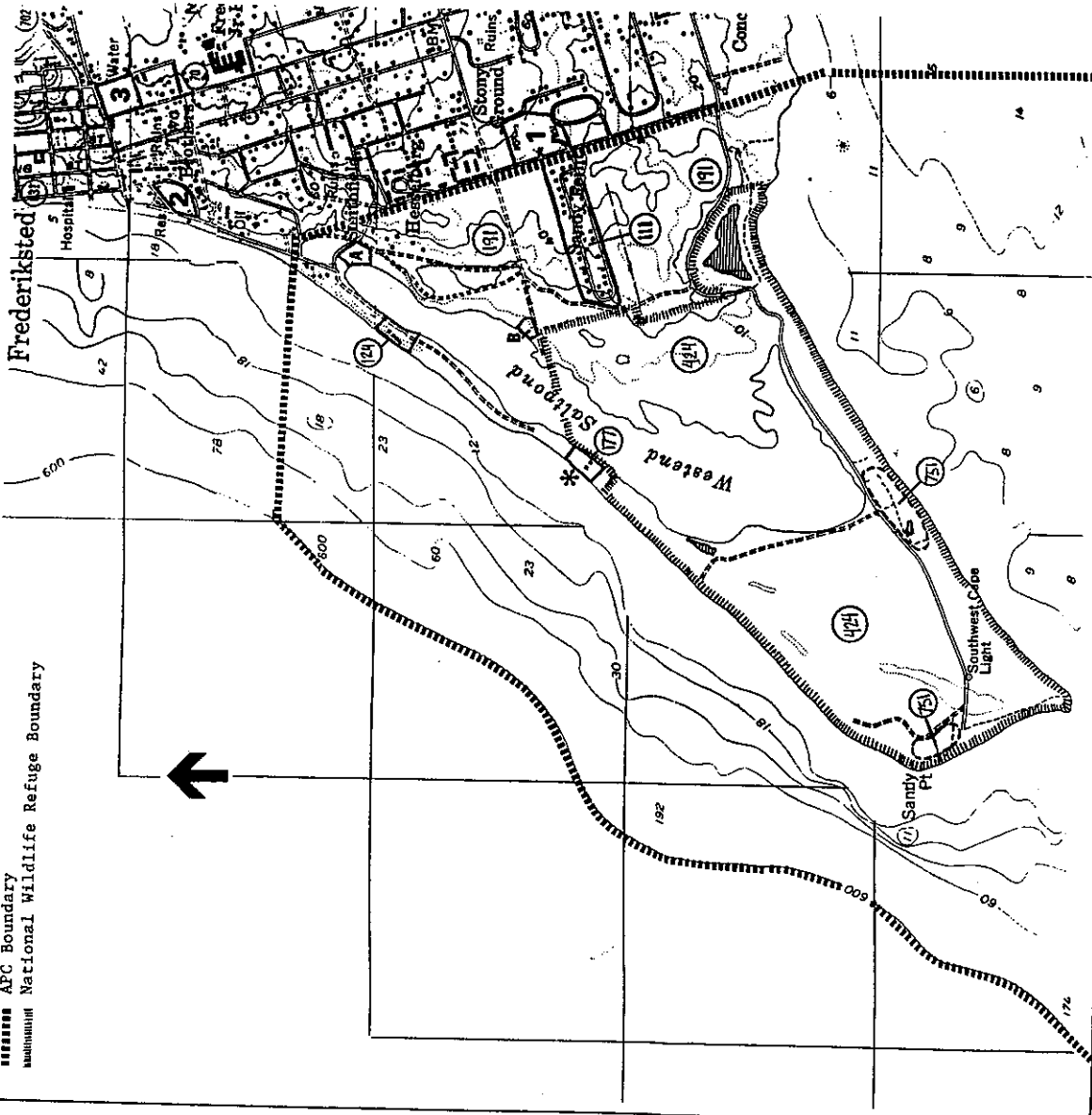
Sandy Point



# SANDY POINT APC

Figure 9  
Location of Kingshill Aquifer  
Adapted from: USGS, 1987  
Island Resources Foundation, 1993

■■■■■ APC Boundary  
 ■■■■■ National Wildlife Refuge Boundary



# SANDY POINT

## LAND USE/COVER

- Residential
  - 111 Single unit (low density)
  - 117 Multiple dwelling (high density)
  - (1) Walter I.M. Hodge public housing project
  - (2) Marley public housing project
  - (3) Harrigan public housing project
- Commercial
  - 124 Harbour Beach Hotel/Condominiums
- Recreational
  - 177 Vincent Mason Recreational Complex
- Openland
  - 191 Undeveloped land
- Open woodland
  - 424 Mixed woodland and coastal brush
- Altered lands
  - 751 Former sand borrow pits
- Other land use
  - A Bay Road lift station
  - B Former lift station (no longer used)
  - \* DPNR water sampling station

Figure 10  
 Land use/cover  
 Base map adapted from: USGS, 1982  
 Island Resources Foundation, 1993  
 1000 0 1000 2000 FEET