U.S. VIRGIN ISLANDS

ST. CROIX

SOUTHGATE POND/CHENAY BAY AREA OF PARTICULAR CONCERN (APC)

and

AREA OF PRESERVATION AND RESTORATION (APR)

A COMPREHENSIVE ANALYTIC STUDY

September 21, 1993

VIRGIN ISLANDS DEPARTMENT OF PLANNING AND NATURAL RESOURCES
Coastal Zone Management Program

Roy E. Adams
Commissioner

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SOUTHGATE POND/CHENAY BAY
APC/APR COMPREHENSIVE ANALYTIC STUDY
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1. INTRODUCTION

1.1 General

The Southgate Pond/Chenay Bay area 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). The APC is located on the north shore of St. Croix, approximately two and one-half miles east of Christiansted. The area, which is also designated as an Area of Preservation and Restoration (APR), encompasses the shoreline and adjacent land areas from Punnett Point to Pull Point, including Green Cay National Wildlife Refuge (NWR), the important avian habitat of Southgate Pond's eastern half, and the recreationally important Chenay Beach.

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 Resources

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 an overall planning and management framework within which the various regulatory entities carry out their 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 specific permit request and its content, rather than in response to previously established guidelines of what is or is not acceptable for the area. The goal of developing an APC management framework is to be able to make *a priori* decisions about the allowable extent to which an entire landscape unit may be modified. In other words, the planning goal is 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 Southgate Pond/Chenay Bay 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 Study and proposed management plan.

The intent of this Study 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

The Southgate Pond/Chenay Bay APC/APR is located on the north shore of St. Croix (Figures 1 and 2). The area is environmentally sensitive. It includes Southgate Pond which is an important wetland area and bird habitat, and Chenay Bay, a nesting ground for the federally listed endangered Hawksbill, Leatherback, and Green sea turtles.

Another fragile environment within the boundaries of this APC/APR is Green Cay, a National Wildlife Refuge designated in 1977 to protect the rare and endangered St. Croix Ground Lizard, *Ameiva polops* (IUCN (NWR), 1982). The wildlife of Green Cay Wildlife Refuge and the offshore seagrass beds and fringing reefs are sensitive to movement of sediment and water pollution (Teytaud, circa 1982). The Green Cay NWR provides habitat for many terrestrial and aquatic species, including nesting sea turtles. The birds found on Green Cay include many federally and locally listed endangered species that use Southgate Pond for feeding, roosting, and nesting.

Southgate Pond covers an area of 39.5 acres (16 hectares). In the 1960's, an artificial dike was constructed, dividing the Pond into western and eastern portions. The western portion was then opened to the sea and used as a boat anchorage. The 140 slip Green Cay Marina, constructed in 1981, now occupies the western portion of the original salt pond. The larger eastern portion is an important wildlife, scenic and educational/research area. It is surrounded by mangroves and wetland vegetation. The total area of the Pond has changed over time due to natural sedimentation at the eastern end and the creation of a dike dividing the Pond (Teytaud, c. 1982). Woody vegetation has covered the naturally filled portion of the eastern end of the Pond. All portions of the Pond are important bird habitats and are used by migratory and wading bird species (Sladen, 1988).

1.4 Other Classifications

Significant Natural Areas:

In 1980, the Southgate Pond/Chenay Bay area has been designated a Significant Natural Area (SNA) [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).

Coastal Barrier Resources System:

Southgate Pond/Chenay Bay was listed on the final Virgin Islands Coastal Barrier Resources System (CBRS) list in 1990 as site VI-04 (Figure 3). 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 three purposes of this system are:

1. to halt development in low-lying areas subject to natural disasters (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.

By law, any kind of federal expenditures (e.g., grants,loans), including federal flood insurance, is prohibited for any development projects within the 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; federal funds can be used under certain circumstances with U.S. Fish and Wildlife Service approval.

Territorial Park System Plan:

In 1981, the APC/APR was identified as an important element in an early Virgin Islands Territorial Park System plan (Alexander, 1981). After Hurricane Hugo, the site was investigated and identified (as site C-7) during the Virgin Islands Territorial Park System Planning Project for its intrinsic natural qualities and high potential for recreational use (Island Resources Foundation, 1991).

The Chenay Bay beach is a popular site for local residents, and is known as a "baby beach" because of its calm waters. It is said to be perfect for beginning snorkelers (pers. comm., T. Merrigan, local concession owner). It is also an ideal area for passive forms of recreation, such as kayaking or bird watching.

2. DESCRIPTION OF THE SITE

2.1 APC Boundary

The boundary for the Southgate Pond/Chenay Bay APC/APR , established by the Coastal Zone Management Commission in October 1991, is described as follows (Figure 2):

Beginning at Pull Point, heading in a southwesterly direction, the boundary follows the old road from Pull Point to Route 82; then in extends in a west-southwest direction along Route 82 to the "Green Cay Marina Road"; then northerly along the "Green Cay Marina Road" to Punnett Point; then continuing north to the

three mile limit or shelf edge (whichever is closer); then east along the three mile limit or shelf edge to a point directly north of Pull Point; and then south to Pull Point, the point of origin.

2.2 Ownership Summary

The majority of land within the APC is privately owned, with individual residences and corporate resort or marina developments predominating. Southgate Pond and the entire beach front below Mean High Water Line are V.I. Government owned.

2.3 Physical Environment

2.3.1 Climate

St. Croix receives an average of about 45 inches of rain per year. The driest months are usually February and March. The wettest months, occurring during hurricane season, are usually September and October. Most of the rainfall comes in brief showers, however, the passage of an easterly flowing tropical wave can occasionally result in heavy rainfall. These waves can develop into tropical depressions, tropical storms, or hurricanes.

The climate of the APC/APR is somewhat arid. Rainfall in the Southgate Pond area is on average less than 35 inches per year. Most of the rainfall on St. Croix occurs on the northwest coast. The vegetation of the island reflects the differences in rainfall. The more arid regions are characterized by xerophytic vegetation such as cacti and low, thorny bushes. Tropical forest and other lush vegetation is supported in areas of greater rainfall.

The Virgin Islands experiences easterly trade winds. At this latitude (about 18 degrees N), at sea level, the temperatures range from mid to high 70's at night to low to mid 90's in the heat of the day during the summers, and low to mid 70's at night, to mid to high 80's in the day during winter months.

2.3.2 Geological Setting

The rocks underlying the APC/APR are comprised of alternating layers of mudstone, silicified mudstone, or chert which were formed by volcanic ash and other debris. These rocks, of the Caledonia Formation, are the oldest on St. Croix. The area is a low-lying alluvial plain formed by erosion from upslope rocks.

Borings taken from the area in 1969 indicate that the underlying soils and sediments are composed of several types of clays. The clays are covered by marine sediments and beach rock. Beach rock formation occurs along carbonated beaches where fresh water containing dissolved CO_2 percolates through carbonate sediments before mixing with the sea water. There are areas of beach rock along the shore of the site.

An important geologic structure in the area is the baymouth bar, separating Southgate Pond from the ocean. Shepard (1952) defines a baymouth bar as follows:

> A baymouth bar is a long, narrow bank of sand or gravel deposited by waves entirely or partly across the mouth or entrance of a bay so that the bay is no longer connected or is connected only by a narrow inlet with the main body of water; it usually connects two headlands, thus straightening the coast. It can be produced by the convergent growth of two spits from opposite directions, by a single spit extending in a constant direction, or by a longshore bar being driven shoreward.

A baymouth bar is a natural formation of most salt ponds, and is usually in a state of dynamic flux on a relatively short geologic time scale. The baymouth bar may be periodically breached by ocean swells (e.g., during storm surge conditions), or by land-based flooding during intense rainfall events. It is a natural process of salt ponds to have such overtopping by water; such changes keep the salinity and temperature levels in the pond in a state of flux, providing energy to the pond ecosystem and allowing a diversity of organisms to inhabit the pond on a cyclical basis.

Soils

[Note: The soils information which follows is compiled from the 1965 and 1970 soil surveys by the U.S. Department of Agriculture Soil Conservation Service (McKinzie, *et al.*, 1965; Rivera, *et al.*, 1970)].

The major portion of the soil found in the APC/APR is Jaucas Sand, occurring on 0-5 percent slopes. This soil type is found extending from Punnett Point along Chenay Bay and bordering Southgate Pond eastward. It is also found around some areas of the Pond and on the southeast coast of Green Cay. This type of soil is made up of calcareous sea shells and coral, and is usually found in narrow, low, hummocky areas along a sandy coastline. It has very low fertility and is drought prone due to its rapid permeability and low water-holding capacity. This soil type has severe limitations in areas where septic tanks are used. It is moderately suited for light industries and trafficways, and is most suited for recreational uses.

Tidal swamp/mangrove swamp soils are found around portions of Southgate Pond. This type of soil is usually covered with salt water and supports a thick growth of mangroves or other hydrophytic vegetation. Large amounts of organic and mucky material are contained by this soil type resulting from decaying vegetation. These areas are usually underlain by shells, coral, limestone, marl, or clay and are important habitats for birds and feeding and breeding areas for oysters and crabs. Because of the wet and marshy conditions, these soils are not suitable for most recreational or load bearing land uses.

Descalabrado clay loam, on 5-12 percent slopes, is found in the southwest corner of the western portion of Southgate Pond, as well as on the coastal area east of Chenay Bay towards Pull Point. This soil readily absorbs water and is moderately high in fertility. Because it has a shallow depth, it has a relatively low water-holding capacity and a shallow rooting zone. It may have numerous gravels and stones on the land surface and mixed throughout the soil. This soil is mostly used for pasture and has moderate limitations for recreational and engineering land uses.

San Anton clay loam, on 5 to 12 percent slopes, makes up a small portion of soil in the southeast portion of Green Cay. This soil occurs on moderate slopes and is deep, well drained, and moderately permeable. It is subject to severe erosion if subject to poor land use practices. It has slight to moderate limitations for recreational and engineering land uses.

Volcanic Rockland makes up the major portion of Green Cay. It usually occurs on 20 to 70 percent slopes and is characterized by having outcroppings of volcanic rock covering 50 to 70 percent of the land surface with the areas in between the outcrops composed of dark yellowish brown gravelly loam. Boulders and stones are commonly seen on the surface. Scrub forest often covers the surface and it has little agricultural use. Volcanic Rockland has severe limitations for all uses. This soil type is listed as SrF, Southgate Rock, in the 1970 SCS soil survey. It is defined as semi-consolidated, intrusive volcanic rock.

Marine geology

The mainland shore is largely sandy beach fronted by beach rock which is often exposed (Figure 8). Beach rock is also found in scattered areas offshore of the site. Chenay Bay is an embayment formed by a northeast point of land (unnamed) and Pull Point which is further northeast. A coral reef extends seaward from this unnamed point; a couple of patch reefs also extend just north of the Chenay Beach Resort. Green Cay island with its fringing reefs lies to the northwest.

Chenay Bay has a maximum depth of about 3.7 meters (12 ft) (NOAA Chart No. 25641). The bottom of the bay is characterized by scattered terrigenous rocks and coral rubble mixed with sand (Coastal Consultants, 1989). Seaward of the rubble zone is a sandy bottom sparsely colonized by seagrasses inshore and heavily colonized offshore.

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. During the past 450 years, damage has occurred from earthquakes and associated tsunamis. Strong seismic shocks were recorded for the Virgin Islands in 1777, 1843, 1867, and 1918. 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) 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 Southgate Pond 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

The area is one of two major floodplains on St. Croix and was formed by alluvium runoff brought down from higher ground to the south. Three watersheds drain into the 39.5 acre salt pond. The southeast basin, which includes about 632 acres (256 hectares), begins in the Seven Hills area about 900 feet (270m) elevation and continues through Mount Washington, Sight, and Maria peaks. A 35 acre (14 hectare) basin starts at 42 feet (12.6 m) elevation west of Southgate Farm. A 112 acre (45.4 hectare) basin directs flow into Green Cay Marina. Two guts with intermittent flow cross the area (Green Cay Development, 1986) [Figure 4].

2.3.4 Coastal Environment

Energetic seas driven by the easterly trade winds wash the headlands of the eastern end of St. Croix. The waves are mostly 1-3 ft (0.3-1 m) high, although they may occasionally attain heights of 12 ft (3.6 m). Waves up to 12 ft (3.6 m) high at the shore may also result from tropical storms or hurricanes passing to the south during the late summer and fall, or from long-period winter waves from the north which steepen as they approach shore.

Seawater in this area is nearly always above 34.00 ppt salinity. Offshore sea surface temperatures range from 25°C (77°F) in February to 28°C (82°F) in July; nearshore sea surface temperatures range from 23°C (73°F) to 30°C (86°F). Temperatures as high as 29.8°C have been recorded in Chenay Bay during August and temperatures as high as 31.1°C have been recorded in the Green Cay Marina (pers. comm., M. Taylor, Marine Advisor, Sea Grant Program).

The tides are mostly diurnal with a weak semi-diurnal component. Spring tides ranging from 0.8 to 1.3 feet are primarily diurnal. Neap tides are irregular and semi-diurnal with a normal range up to 6 in (15 cm). Currents in Chenay Bay generally flow towards the west at speeds of 0.2 to 0.5 knot (0.1 to 0.23 m/sec) (Island Resources Foundation, 1977; Eden Beach Corp., 1988).

2.4 Biological Environment

2.4.1 Terrestrial

Unmanaged vegetation of the APC includes that surrounding the salt pond, vegetation found on Green Cay NWR, and along the Chenay Bay beach area. The beach ecosystem includes areas of no vegetation, low beach grass, succulents, shrubs, and trees. Three terrestrial ecotypes are found in the area: mixed scrub woodland and savanna grasslands, baymouth bar vegetation, and a salt pond/mangrove system (Figure 9).

What is now the eastern portion of Southgate Pond encompasses a 16 hectare, shallow, brackish, impounded pond, more than 40 percent of which is covered with woody vegetation. White mangrove (*Languncularia racemosa*) is the dominant vegetation, with scattered stands of black mangrove (*Avicennia germinans)* and one small stand of red mangrove (*Rhizophora mangle*). A large portion of the white mangrove vegetation east of the Pond was destroyed by Hurricane Hugo. A berm separates the Pond from the sea. The berm vegetation includes manchineel, genip, seagrape, and tan (Sladen, 1988). Much of the manchineel was destroyed by Hurricane Hugo and has only slowly begun to regenerate.

The Southgate Pond conditions vary temporally from nearly fresh water which can be as much as 3 ft (1 m) deep after heavy rains, to saline (40 ppt) during the dry season, to no water in very dry years. Fish, crustaceans, and other invertebrates inhabit the Pond during wet periods. During dry periods, many species of birds feed on dead and dying fish and eggs and use the dry pond bed for nesting.

The low beach vegetation is mostly dominated by the common beach grass (*Distichlis spicata*) interspersed with a small quantity of beach morning glory (*Ipomea pescaprae*). The tree line consists of mostly seagrape (*Coccoloba uvifera*) with a mixture of acacia (*Acacia tortuosa*) and tan-tan (Leucaena glauca) with almost no understory of shrubs. Several large coconut palms (Cocos nucifera) are found along the beach tree line.

Southgate Pond supports the highest diversity of wetland-dependent and endangered or threatened bird species of all ecosystems in the Virgin Islands. Fifteen duck species have been recorded at the Pond and as many as 400 ducks have been known to winter in this area at a given time. The wildlife includes lizards, geckos, birds, crabs, mongooses, and deer (Sladen, 1988).

As many as 40 Great Egrets, 50 Brown Pelicans, and 30-40 Snowy Egrets have recently been seen at the Pond feeding prior to the dry season (pers. comm., B. Knowles, DPNR/DFW). Over 40 nesting Least Terns and 70-80 Brown Pelicans have been seen during the dry season (pers. comm., G. Hughes, USFWS).

Chenay beach and Green Cay are used as nesting grounds by three species of sea turtles: Hawksbill (*Eretmochelys imbricata*), Green (*Chelonia mydas*) and Leatherback (*Dermochelys coriacea*). All of these species are federally protected, rare or endangered species.

Green Cay is the only remaining area in the Virgin Islands that supports a significant population of the federally listed endangered St. Croix Ground Lizard, *Ameiva polops* (pers. comm., G. Hughes, USFWS).

White-tailed deer *(Odocoileus virginianus)* can also still be seen in the area (pers. comm., M. Neuburger, local resident).

2.4.2 Marine

The Marine resources in the APC include seagrass meadows, sand flats, coral reefs, and submerged beach rock. When full, the Pond supports aquatic communities, such as *Tilapia mosambica*, crustaceans (*Calinectes* spp.), and a dense growth of *Ruppia* spp. (Sladen, 1988). Fish and other invertebrates are most abundant in the beach rock area. Species of coral found here include elkhorn coral,(*Acropora palmata*), brain coral,(*Diploria labyrinthiformes*), and star coral,(*Porites astreoides*).

The major invertebrates found in the area include urchins, *(Tripneustes ventricosus*, *Enchinometra lucunter* and *Diadema antillarum*); sea anemones *(Condylactis gigantea* and *Bartholomea annulata*); and the feather duster worm *(Sabellastarte magnifica*). Fish found include herrings *(Clupeidae*), squirrelfishes *(Holocentridae*) and snappers *(Lutjanidae*).

Note: A detailed description of the marine resources in the APC is given in the Green Cay Development EAR (1986) and the Turtle Run Development EAR (1988).

2.4.3 Endangered Species

The U.S. Endangered Species Act of 1973 (16 USC Sec. 1531) 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 endangered animal species are either known to occur, or have a reasonable probability of occurring, within the Southgate Pond/Chenay Bay APC:

Federally listed:

1. Green sea turtle *(Chelonia mydas)*
2. Hawksbill sea turtle *(Eretmochelys imbricata)*
3. Leatherback sea turtle *(Dermochelys coriacea)*
4. Brown pelican *(Pelecanus occidentalis)*
5. Peregrine falcon *(Falco peregrinus)*
6. Roseate tern *(Sterna dougallii)*

All three species of sea turtles have been observed nesting at Chenay beach, which is one of the five most important sea turtle nesting spots on St. Croix. In addition, the federally listed endangered Humpback whale *(Megaptera novaengliae)* is known as an offshore migrant through the area.

Locally listed:

1. Least grebe *(Podiceps dominicus*)
2. White-tailed tropicbird *(Phaethon lepturus*)
3. White-crowned pigeon *(Columba leucocephala*)
4. Least Tern *(Sterna antillarum)*
5. Great blue heron *(Ardea herodius*)
6. Great (common) egret *(Casmerodius albus*)
7. Snowy egret *(Egretta thula*)
8. Black-crowned night heron *(Nycticorax*)
9. Least bittern *(Ixobrychus exilis)*
10. Bahama duck *(Anas bahamensis*)
11. Ruddy duck *(Oxyura jamaicensis)*
12. Clapper rail *(Rallus longirostris*)
13. Caribbean coot *(Fulica caribea*)
14. Snowy plover *(Charadrius alexandrinus*)
15. Willet *(Catoptrophorus semipalmatus*)
16. Audubon shearwater *(Puffinus Iherminieri)*
17. Bridled quail dove *(Geotrygon mystacea)*
18. Fisherman bat *(Noctilio leporinus*)
19. Cave bat *(Brachyphylla cavernarum*)

2.5 Cultural Resources

2.5.1 Prehistoric

There are two known archaeological sites in the Southgate basin: one on Green Cay (island) and one inland. Both were probably inhabited sometime between 950 to 1250 A.D. (Figueredo, 1988).

Studies indicate that Amerindians used Green Cay for processing conch. It is estimated that at least 33,000 shells were discarded in an Indian midden dating to 1000 A.D. (USFWS, 1989; IUCN, 1982).

2.5.2 Historic

A sugar plantation was present sometime in the late 1750's within the APC. Sugar cane cultivation activities are evident by the presence of a masonry windmill tower used for grinding sugar cane. Other historic structures to be found within the APC include a kiln used to make lime and a masonry well about 200 feet long and over 10 feet

high, capped with beveled mortar. It is unclear what purposes this structure served. Should, at a future date, development be planned in this area, it will be worthwhile to require fuller investigation of this wall and any civilization that may have occupied the area within the APC.

2.6 Built Environment

2.6.1 Roads and Ports

The boundary of the APC follows the road from Pull Point in a Southwesterly direction to Route 82 (following the contour line), then in a SSW direction along Route 82 to the "Green Cay Marina Road". There is a road from this intersection to Punnett Point that is also within the APC/APR boundary. There are two beach access roads, one on either side of the Pond. The western road must be accessed through the entrance to Green Cay Marina.

The Green Cay Marina has 140 slips that are usually at 90 - 95 percent occupancy. The maximum length of boats docked is 80 - 90 feet with one slip that can accommodate a 100 ft. vessel.

2.6.2 Water Systems

Rain water is collected and stored in cisterns located at most residential dwelling units. There is no public supply of water to the APC.

2.6.3 Wastewater Systems

Wastewater is disposed of by means of individual septic tank systems and leach fields. There is no "community-type" septic system or sewage treatment system serving residential needs within the APC. Both the Green Cay Marina and the Chenay Bay Beach Resort operate tertiary sewage treatment plants. The former plant is designed to handle 20,000 GPD, while the latter plant is designed to handle flows of 13,000 GPD.

2.6.4 Energy Systems

Electrical energy is supplied to all areas within the APC by the V.I. Water and Power Authority.

2.6.5 Solid Waste Disposal Systems

Residents within the APC are required to dispose of household solid waste at the public roadside dumpsters provided by the Department of Public Works. As elsewhere in the Territory, commercial establishments are responsible for transporting solid waste to the Anguilla landfill on the island's south shore.

3. RESOURCE USE, USE CONFLICTS, AND ADVERSE IMPACTS

3.1 Resource Use

There are five general land uses presently identified within the boundaries of the Southgate Pond/Chenay Bay APC/APR (Figure 5). They are as follows:

1. Parks/Recreation/Open Space - Green Cay Island is a National Wildlife Refuge and is entirely used for this purpose.

2. Residential (Low Density) - Pull Point and Punnett Point are zoned low density which allows a maximum of two structures per acre.

3. Waterfront/Marine - The areas around Southgate Pond are set aside for water-dependent uses. This includes the area surrounding Green Cay Marina located in the western portion of the Pond.

4. Hotel/Resort - Tamarind Reef Hotel is being reconstructed on its original foundation which is located adjacent to the opened western portion of the Southgate Pond. Chenay Bay Beach Resort is located on the eastern portion of Chenay Bay.

5. Undeveloped - The areas surrounding the eastern portion of Southgate Pond and Chenay Beach presently remain undeveloped.

Residential structures in the Southgate Pond/Chenay Bay area are limited to the areas of low density development on Pull Point and Punnett Point.

The Chenay Bay area is used by local residents for camping during the holidays. The area is also regularly used for fishing and picnicking.

The major resort development in the area is the Chenay Bay Beach Resort located east of Southgate Pond on Chenay Beach. This development consists of 50 units, including a bar and restaurant and a 13,000 GPD tertiary sewage treatment plant with a 39,000 gallon effluent storage cistern and standby diesel generator.

The 140-slip Green Cay Marina occupies the western portion of Southgate Pond. The marina was dredged to a 10 foot depth in 1980, but is now approximately 9 feet deep due to sedimentation. Maintenance dredging on the channel must be performed about every three years. Existing development at the Green Cay Marina site also includes a 20,000 GPD tertiary sewage treatment plant, a restaurant, a bar, and several retail shops.

Planned facilities

There are currently four active CZM permits in the Southgate Pond/Chenay Bay APC/APR. The scope of work for each permit approved is described as follows:

1. A permit approved to allow renovation and construction of a 46-room hotel on the existing Tamarind Reef Hotel foundations at Plot No. 56, Estate Southgate.

2. A permit approved to allow construction of twelve buildings, including a 36-room hotel, 24 two- and three-bedroom beach resort housing units, a great house with conference room, a restaurant and accessory retail space, an administrative building, a reception building, pool, reverse osmosis unit, beach rental unit, cisterns, sewage treatment plant and related infrastructure on approximately 8.7 acres on the northside of Plots No. 60 and 64 of Estate Southgate Farm, East End quarter A, Christiansted.

3. A permit approved to allow construction of: (A) 550 hotel/condominium units consisting of (i) 190 efficiency units to serve as the central hotel core facility; (ii) 36 one-bedroom condominium units; (iii) 180 two-bedroom condominium units; and (iv) 144 three-bedroom condominium units; (B) A 27,775 square-foot retail center within the core hotel, including a restaurant and various hotel-related sales operations; (C) Two fresh water ponds; (D) A central swimming pool and five small satellite pools; and (E) Related roads, utilities, and infrastructure. All of the foregoing to be constructed on Plots Nos. 84, 84A, 84B, 8 and 48 of Estate Green Cay. The related support utilities to be constructed on Plot No. 32 Estate Green Cay.

4. A permit approved to allow construction of 74 dwelling units, manager's residence, two tennis courts, health club, three swimming pools, a pool house, a pond, garage and maintenance to building underground sewage treatment plant, reverse osmosis plant, emergency generator, a perimeter wall, landscape support facilities and related infrastructure at plots Nos. 10, 10-B, 10-D and 12 Estate Green Cay.

3.2 Use Conflicts

Some portions of the above described developments present conflicts with the surrounding environment (Figure 7).

The development of the Southgate Pond area (as described in permit request No.2 above) would adversely affect the wildlife habitat of the Pond and Green Cay. The construction phase would disturb turtle nesting on Chenay Beach and Green Cay, while lighting from the finished structures near the beach, if not properly designed, would disorient the hatchlings on Green Cay (pers. comm., G. Hughes, USFWS).

In 1989 the St. Croix Environmental Association stated that the reduction of the Pond's size would result in a significant reduction in its number of bird species. As stated in a 1991 description of the APC's from DPNR:

> Proposed development on the fragile baymouth bar, fronting the undeveloped eastern half of Southgate Pond, threatens the value of this area as habitat for local and federally listed (endangered) wildlife and sea turtle species. Chenay Beach is located between the sea and the eastern pond. In addition to affording fine views of Green Cay, this area serves as important nesting habitat for three species of federally endangered sea turtles.

In addition to the destruction of wildlife habitat, sedimentation and erosion caused by development could be detrimental to the water quality of the marine environment.

The baymouth bar, approximately 200 ft wide with an elevation of 7.8 ft., is a geologic structure in a state of dynamic flux. Heavy rainfall in Southgate Pond causes the water level to rise beyond its carrying capacity, resulting in runoff guts across the baymouth bar causing accelerated beach erosion. Equilibrium level is maintained somewhat by the low water-holding capacity and very rapid permeability of Jaucas Sand. The proposed development on this sandbar could cause the destruction of this equilibrium (Moore, 1988).

Virtually the entire property involved in permit request No. 3 lies in the 100-year flood zone. To comply with the Virgin Islands flood regulations the permittee plans to do extensive filling to raise the buildings.

3.3 Adverse Impacts

3.3.1 Water Quality

Since 1968, the Division of Environmental Protection of DPNR has monitored the water quality in Chenay Bay. Two stations are used for water sampling. One is located directly off Chenay Beach and the other is in the Green Cay Marina. The water in the bay is normally clean and clear, with occasional turbidity, probably caused by stormwater runoff. While the fecal coliform levels at Chenay Bay are generally negligible, the levels in the marina often exceed the Class B water quality standard of 70 colonies/100ml, and sometimes exceed the federal "swimmable" criteria of 200 colonies/100ml (pers. comm., M. Taylor, Marine Advisor, Sea Grant Program).

Various (unconfirmed) reports indicate that the presence of the marina has generated water quality problems in the western portion of the pond due to only limited water exchange between the marina and the open ocean. Although good restroom facilities exist, usage levels necessitate additional actions to reduce the pollution loading in the marina, or increase its flushing rate.

With only one small opening into the marina, the water exchange between the marina and the open ocean is sub-optimal. Although the marina owners officially prohibit boaters to discharge sewage waste into the marina, lack of enforcement occasionally results in elevated nutrient inputs and high bacterial levels.

Special studies to examine the presence of toxins in the water column and sediments have revealed little or no contamination in the APC, except within the marina basin. Relative to other marine sediments on St. Croix, the marina basin has elevated levels of chromium, copper and nickel (USEPA, 1992). The source(s) of these toxins has not yet been established, however, such contaminants are often associated with the marine boating industry.

The Division of Environmental Protection has previously cited the marina for failing to meet water quality standards (pers. comm., M. Taylor, Marine Advisor, Sea Grant Program). The facility has recently installed a 20,000 GPD tertiary sewage treatment plant which should resolve the problems they have had with their failing septic tank leach field. The effluent is being used for on-site irrigation.

3.3.2 Air Quality

There are no known adverse impacts to air quality within the APC.

3.3.3 Noise Pollution

Aside from the typical levels of noise associated with motor vehicles and vessels, there are no known major sources of noise pollution within the APC. The use of jet skis in recent years has, however, resulted in some conflict with other persons wishing to utilize the Chenay Bay area for "passive" recreational pursuits.

3.3.4 Impacts to Biological Resources

Because of early modifications in vegetation when settlers began clearing the land, Southgate Pond has changed in size several times. According to old maps, the Pond was the same size in 1754 as it is today, but grew from 1754 to 1799, and then shrank again (Figueredo, 1988). The Pond is now about one-third its size of 100 years ago (Sladen, 1988).

In the 1960's, the Pond was separated by fill into eastern and western portions; the latter was opened to the sea. The artificial dike then constructed is the probable cause of the tendency of runoff entering the eastern half of the Pond to flow eastward out the channel just west of the Chenay Bay Beach Resort (Island Resources Foundation, 1991). Artificial fill and natural (possibly accelerating) sedimentation over time as well as other alterations to the Pond drainage have caused the salt pond to decrease in area over time.

3.3.5 Impacts to Cultural Resources

There are no known adverse impacts to prehistoric resources within the APC. The historic structures seem to have suffered little impacts due to human intervention.

4. MANAGEMENT RECOMMENDATIONS

4.1 Policy Framework

As stated in the preliminary land use plan for St. Croix, (Strategic Planning Group, 1990), development in the area is restricted by moderate slopes and a lack of potable water supply. Because of the arid climate, fresh water collection through surface catchments is restricted. Nevertheless, resort development continues to be attracted to the area.

Southgate Pond and the surrounding mangrove community have been designated an Area for Preservation and Restoration. Chenay Beach is a primary nesting ground for three species of endangered and threatened sea turtles, and has been identified as one of the five most active sea turtle nesting beaches on St. Croix. This is important because under Section 906 of The Environmental Laws and Regulations of the Virgin Islands, environmental policy for the first tier is to conserve significant natural areas for their contribution to marine productivity and value as habitat for endangered species and other wildlife.

The area is also included in the Coastal Barrier Resources System (Figure 3), approved by the U.S. Congress in legislation which went into effect on November 16, 1990 (See Section 1.2). The Coastal Barrier Resources Act, passed by Congress in 1982 and amended in 1990, recognizes that coastal barriers provide:

1. (A) habitats for migratory 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.

Chenay Beach has potential for increased public recreational use because of its proximity to Christiansted. Earlier recommendations for a Territorial Park System include the areas of Chenay Beach and Southgate Pond (Section 1.2).

Recognizing the current mix of activities, constraints, and stressors, as well as future planned developments in the area, the following general recommendations are made for the Southgate Pond/Chenay Bay APC/APR:

1. *Preserve the natural habitat of the remaining undeveloped eastern portion of the Pond, and restrict further development of the fragile baymouth bar and Chenay Beach areas.*

2. *Provide protection for the habitats of endangered species that presently use the area for feeding, nesting, and breeding, including three federally listed species of sea turtles, two bird species, and the St. Croix Ground Lizard, and over ten species of locally listed endangered bird species.*

3. *Monitor existing development and reconstruction to control land and water pollution and to preserve areas of residential and commercial development.*

4. *Ensure that Chenay Beach coastal developments do not impact the Green Cay NWR.*

4.2 Planning and Permitting

The Southgate Pond APC is currently comprised of three (3) different zoning designations (Figure 10). Pull Point to the area of the salt pond is designated as R-3 (residential medium density). Areas within and surrounding the pond are zoned as W-1 (waterfront pleasure). Punnett Point is zoned as R-1 (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 areas of the Territory as one of ten (10) classifications. The CLWUP designated the areas around Southgate Pond including Pull and Punnett Points as medium density residential. Chenay Bay Beach was designated as conservation for recreational and traditional uses, and to protect nesting habitat of the Federally listed Green, Leatherback, and Hawksbill sea turtles.

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.

Water

To ensure the preservation of the adjacent coral/algal reef systems, DCCA's recommendations (Teytaud, 1980) provide a useful conceptual framework for a management scheme:

1. Current water quality standards should be revised with the intention of decreasing turbidity. Further research and analysis to define critical turbidity limits for these reefs should be promoted and supported.

2. Stringent controls should be placed on development permits for upland areas for the purpose of prohibiting erosion and soil runoff, consistent with existing soil and water management requirements. Further damage through sedimentation of the reefs must remain a highly prohibited consequence of any and all upland activity.

3. Permits should not be issued for dredging or filling in reef complexes.

4. Discharge of thermal, saline, or high nutrient wastes should be prohibited and toxic wastes or heavy metals shall not be discharged into the marine environment.

5. In the event of an oil or hazardous material spill, emergent portions of reefs should be given high priority protection, particularly during periods of low tides.

6. Development resulting in alteration or blockage of circulation or wave action should not be permitted in, or up-current from, reef complexes.

7. Anchoring should be prohibited in all reef zones other than pavements; designated mooring areas should be provided in areas of intensive use, in the absence of which anchoring remains prohibited.

8. The marina should provide a pump-out station for the live-aboards as well as transient vessels to minimize pumping of sewage into the sea.

The close proximity of the water table to the surface makes the area susceptible to surface and water pollution. The salt pond is a delicately balanced ecosystem and acts as a sediment trap and barrier to the bay. Any development in the area needs to incorporate proper sewage design, with attention to the cumulative impacts of sub-standard design and construction practices.

The following recommendations should be considered for this area to maintain overall water quality in the APC:

Water quality standards should be revised to provide greater protection to these waters. This should include stricter standards for turbidity (NTU, TSS and Secchi), fecal coliform, and nutrients.

The Water Pollution Control Act should be amended and the definition of the "Waters of the Virgin Islands" changed to include wetland areas. Standards for wetlands development and conservation should be developed.

The exact linkages between certain chemical water quality criteria and the quality of the biological environment (i.e., coral reefs, seagrass beds, etc.) are not well understood. Therefore:

To protect the sensitive benthic biota in the area, biocriteria should be developed and a monitoring program established.

This area should be made a "no discharge zone", with no further issuance of TPDES permits. If the area is not designated as a "no discharge zone", all dischargers should be made to meet water quality standards at the "end-of-pipe" (no mixing zones should be allowed).

The water quality of Chenay Bay is normally clean and clear. Any development or reconstruction activities should be monitored to limit runoff into the bay.

Presently, marina activity has contributed to reduced water quality conditions. Therefore:

The water quality in the western portion of the Pond as well as its flow to the open ocean should be regularly monitored. Restroom facilities at the marina should be properly maintained and their use should be encouraged. Flushing rate of the Pond should be monitored to determine whether or not it is adequate to sustain present use.

Solid waste

During a recent reconnaissance survey (August 1992), junk tires were seen in parts of the Pond, and some junk cars and parts were discarded on the road directly east of the Pond leading to Chenay Beach. Evidence of a squatter's residence was observed on Chenay Beach next to the eastern side of the Green Cay Marina channel. According to Hughes (1992), junk cars and other types of solid waste have not been as much of a problem in the Southgate Pond/Chenay Bay area as in areas such as Great Pond. This should be monitored and existing solid waste should be removed regularly from the Pond and beach access road.

Presently there does not seem to be a problem with the collection of solid waste in the APC. However, the solid waste issue should be carefully considered for any new developments since the Estate Anguilla landfill has reached its fill capacity and will be required to meet stricter federal standards within one year. (Note: All landfills in the United States and territories will be required to meet stricter USEPA regulations by October, 1993).

To preserve the remaining ecosystem of the presently undeveloped portion of the salt pond and Chenay Beach,

> *All solid waste should be removed from the APC/APR and disposed of properly. Dumping and littering around the salt pond should be especially discouraged. Derelict cars on the eastern access road as well as discarded tires in the Pond should be removed. Clear lines of responsibility need to be established for waste collection and litter control in various areas, and a monitoring plan and program implemented.*

Hazardous waste

Hazardous materials that are used for construction and boating, including waste oil, should be stored and/or disposed of in a safe manner to protect the marine and terrestrial environments. Waste oil is presently classified as a hazardous waste. DNPR/DEP is working with an interagency task force to reclassify waste oil as "special" waste, which would allow incineration (e.g., at WAPA power plants). On August 20, 1993 the rule revision, which would accomplish, this goal was sent to the Governor's office for approval and enactment.

DPNR/DEP is involved in a committee with WAPA, Hess Oil Virgin Islands and the Gasoline Retailers Association, which includes Texaco Caribbean, Esso Virgin Islands and other major oil producers and suppliers, to create a meaningful plan for the collection and eventual burning of used oil by both WAPA and Hess.

Presently, however, there are no officially sanctioned disposal sites or methods for handling petroleum product wastes. Business owners are asked to store waste oil on-site, in properly sealed containers with secondary containment devices. Secondary containment devices are required if it is determined that this storage is within the first tier of the coastal zone and is classified as a terminal facility.

> *All hazardous and special wastes produced through any use of this area should be removed and disposed of in a safe manner. Proper disposal of hazardous wastes such as diesel fuel, used lubricating oil, bottom paints, and other marina-associated wastes should be monitored and strictly enforced.*

Air

Air pollution is of minor significance in the Southgate Pond/Chenay Bay area. Any event causing air pollution should be addressed and rectified as quickly as possible.

> *Activities resulting in heavy exhaust fumes or other toxic or noxious gasses should be prohibited.*

Noise

Loud noise around the Pond and beach area will disrupt the nesting of sea turtles and the nesting and feeding of the birds that use the Pond.

Excessive or loud noise resulting from recreational and/or developmental activities should be prohibited.

Biological Resources

Wetlands make up 2-3 percent of the total land area of St. Croix and perform a number of crucial ecological and economic functions (Gieben, 1989). They support many species of wildlife, act as pollution filters, and help to control flooding. The U.S. Fish and Wildlife Service currently monitors Southgate Pond and eight other ponds on St. Croix through the Use of Wetlands Monitoring Program.

Southgate Pond is described as a "semi-permanent fresh to brackish pond" in the Virgin Islands Action Plan and Wetlands Addendum (July 30, 1987 - July 30, 1989). It is described as a fresh water system when first flooded at the beginning of the rainy season, becoming brackish by the end of the dry season.

Southgate Pond is described in *Wildlife Use of the Virgin Island's Wetlands* as follows (Knowles, *et al.*, 1991):

> This 14 hectare wetland is on the north shore, east of Christiansted. It is separated from Chenay Bay by a 30m wide beach berm vegetated by manchineel and casha. There is one low lying "gut" through which storm surges will flow into the Pond. There is a fringe of black mangroves on the west and south sides. A beach access road abuts the narrow western fringe of black mangroves. The south black mangrove fringe is bordered by wetland grass. Canopy height on the fringes is less than 4m, canopy cover is 30 percent. The east side consists of a mixture of patches of black and white mangroves interspersed with open mudflats. Canopy height is less than 4m, cover is 20 to 40 percent. This mangrove stand ends at a beach access road. Old maps suggest that this wetland was once considerably larger. Salinity ranges from 1.2 to 21.6%. The bottom is hard mud. The wetland is classified as a basin, estuarine, intertidal, scrub-shrub wetland.

The eastern portion of Southgate Pond is valuable as one of St. Croix's few remaining wetland areas. It should be preserved in its present state as it performs several important functions, including:

1. *Wildlife habitat for many species living in the Pond and surrounding mangrove system.*
2. *A pollution filter, improving water quality in Chenay Bay.*
3. *A flood control buffer for the surrounding coastal areas.*
4. *A potential educational and research study area.*

Developments that disrupt these functions should be strictly discouraged. Development around Southgate Pond, especially on the physically vulnerable baymouth bar, would result in adverse impacts to the fragile ecosystem of the salt pond and its surrounding area. Accelerated sedimentation from land clearing and soil compaction from heavy equipment could exacerbate flooding potentials due to pond infilling and shrinkage. Development would disrupt the Pond's natural action as a sediment filter for water flowing into Chenay Bay. The taking of conch and spearfishing should be strictly controlled. Regulations should be formulated to control loud and disruptive parties on the beach.

To preserve the developed and undeveloped portions of the wetland:

The western portion of the Pond, occupied by the Green Cay Marina, should be monitored for water quality and land-pollution. If necessary, artificial means of increasing flushing rates in the Pond should be considered, as should strategies for reducing nonpoint sources of pollution.

Physical Environment

A follow-up investigation to the Post-Hurricane Hugo Environmental Assessment and Territorial Park Planning Project carried out by Island Resources Foundation for DPNR in 1990-91 should be done to assess the quality and amount of regeneration during the nearly three years since the passage of Hurricane Hugo.

Because the area is part of a floodplain, water levels around the marina channel should be monitored.

Residential Development

To minimize environmental damage to the Southgate Pond-Chenay Bay area from erosion and runoff:

New residential development should be carried out in a manner that will minimize exposed soils and utilize the best available technologies for sediment control and water runoff.

Minimum lot sizes should be established, in conjunction with subdivision development regulations, to control the amount of septic loading per unit area based on the slope, type of sewage treatment used, and assimilative capacity of the soils.

The Southgate Pond/Chenay Bay area acts as a sediment sink for runoff waters received from the watershed. Hydrographic studies, and the development of a stormwater management plan for the watershed, should be carried out to minimize impacts of present and future development.

Commercial Development

The Southgate Pond-Chenay Bay area has been identified by the territorial Government in several planning documents as an area requiring special management considerations. These include its classification as an Area of Particular Concern, an Area for Preservation and Restoration, and a Significant Natural Area. It is also included in the Virgin Islands Coastal Barrier Resources System.

The undeveloped eastern portion of Southgate Pond is a primary habitat for many species of endangered birds and supports a diverse community of organisms in the mangrove system. In addition, Chenay Beach is a primary nesting ground for endangered sea turtles. Green Cay is one of the last remaining habitats for the St. Croix Ground Lizard. Construction of additional commercial facilities in this area, especially in the physically vulnerable baymouth bar area, would alter this fragile ecosystem and negatively affect wildlife.

The area is a floodplain, located in the coastal lowlands. Water level in the Pond could be altered from construction and use of the land, potentially causing flooding of the surrounding areas.

Considering these constraints:

Substantial development of plots 60 and 64 Estate Southgate Farm, should be carefully assessed. Ecological as well as socioeconomic impacts from such development should be identified and carefully reviewed.

A minimum of a 150 foot buffer zone around Southgate Pond should be provided in any proposed development.

Development should not be permitted where it is inconsistent with the nature, scale and character of the existing communities.

Recreational Use

The Southgate Pond-Chenay Bay area has great potential for educational and recreational development.

The eastern portion of Southgate Pond should be developed as a nature site with trails along the beach berm and to the Pond for wildlife observation.

The eastern side of Chenay Bay should be developed as a swimming and snorkeling area with use of the baymouth bar area as a low-pressure day-use picnic, sunbathing, and swim area.

To protect the users of current recreational areas:

Water-related activities such as boating, diving, snorkeling, etc. should be monitored especially in areas of high and diverse use such as the waters adjacent to the Chenay Bay Beach Resort.

Transportation

Although road access to the beach is desirable, the noise and other disturbances associated with vehicular traffic interfere with birds nesting at the Pond. No other waterfront vehicle access roads need to be designated, and driving along the beach (and other beaches in the Virgin Islands) should be entirely dissuaded. Vehicular traffic damages berm vegetation, possibly reducing the storm protection capabilities of the beach berm system. Driving along the beach would also disrupt or inhibit sea turtle nesting.

Expansion of existing beach access roads and/or construction of additional roads is not recommended.

Major roads as well as beach access roads should be maintained. Further construction or expansion of existing roads is not recommended.

Existing marina activities should be monitored to protect the adjacent undeveloped wetland area and Chenay Bay.

Noise

Noise pollution is not presently a problem on the beach or around the Pond. However, sea turtles nesting on Chenay Beach and Green Cay, and the many bird species using the Pond, are sensitive to loud noises. Potential noise problems such as construction, large group gatherings, or loud, electrically amplified music, should be monitored and regulated.

Education

The Virgin Islands Coastal Management Program and Final Environmental Impact Statement suggests that Chenay Beach should be acquired and developed as a public beach facility because of its significant ecological value as well as its potential for recreational use, given its proximity to Christiansted. This document recommends that the eastern portion of Southgate Pond should be preserved as a wildlife, educational, and research reserve area (U.S. Department of Commerce, 1979).

Suggestions for recreational/educational use of the area are offered in the Virgin Islands Territorial Park System Plan (Island Resources Foundation, 1991), and include the following:

> The development of the baymouth bar area as a low-pressure, day-use picnic, sunbathing, and swim area.
>
> Demarcation of a swimming and snorkeling area at the eastern side of Chenay Bay where the beach sand is concentrated.
>
> Development of observation/nature trails along the beach berm and to the Pond for wildlife observation.

Natural Hazards

The Virgin Islands periodically experience hurricane-force storms. St. Croix was extensively damaged by Hurricane Hugo in 1989. The electrical distribution network of the island was virtually destroyed, as well as 95 percent of all houses and extensive stands of trees and other vegetation.

Tropical Storm Iris, with heavy rains, followed one week later, causing massive flooding on various parts of the island and inflicting major property damage to homes, especially to those already de-roofed by Hurricane Hugo.

A 1990-91 post-Hurricane Hugo aerial damage assessment found that the stand of trees along the beach berm, and the mangroves surrounding the Pond, suffered some storm damage. Ground observations indicated that the mangroves suffered 50 percent mortality and 100 percent dieback with regeneration occurring from the base. Other trees suffered exposed roots and tip-ups. Over 50 percent of the manchineel suffered damage. Aerial photo observations indicate the following impacts from Hugo (Island Resources Foundation, 1991):

1. Mangrove community sustained severe damage (70-80 percent);
2. Vegetation line recession approximately 5 m throughout the Chenay Bay barrier beach;
3. Numerous blowouts (40 to 60 feet) along this stretch of shore;
4. Noticeable sediment accretion on the lee side of the groin (breakwater);
5. Local erosion accentuated by the location of the groin;
6. Turbidity plumes.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) for the Virgin Islands identify and classify areas subject to flooding and denote the boundary limits for projected 100-year and 500-year floods (Figure 6). Flooding may be caused by both inundation of the sea and/or by concentrated runoff from the surrounding watershed during storm periods. 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 maps are used to determine base flood elevations, or how high above ground level new structures must be built.

An attempt by Green Cay Development at building a "display" condominium showed that the eastern part of this area is a major drainage basin for the surrounding watershed. Watermarks on the side of the condominium building

at five feet above the ground attest to the volume of water concentrated into this low, flat-lying area following a storm period (Island Resources Foundation, 1991).

A major consideration in the development of this area is the possibility of flooding around the marina channel. During periods of high rainfall, the backup of runoff waters caused by restricted flow through the channel could result in a rapid elevation of the water level in the Pond and flooding of the lowland area (Island Resources Foundation, 1991).

During heavy rainfall, the water level of the Pond rises and overflows towards the sea. The portion of Route 82 along the southern APC/APR boundary is often flooded during heavy rainfall (pers. comm., Dr. Gladfelter, Marine Biologist).

The Federal Coastal Barrier Improvement Act of 1990 established areas in the Virgin Islands as part of the Coastal Barrier Resources System. The APC is listed as site VI-04 (Figure 3) of the CBRS. Section 1.2 describes the purpose of this system.

4.3 Institutional Development

Successful management of the Southgate Pond/Chenay Bay APC will come about more quickly and with more lasting results if the local community, including the landowners in the area, is drawn into the planning process. This was the hope during drafting of the APC Comprehensive Analytic Study, and to this end DPNR solicited input from all user groups in the area. Hopefully, the various environmental and cultural organizations, and other commercial and philanthropic organizations will work together and in conjunction with DPNR to address certain specific components of the overall management framework, and even to finance certain elements (including fundraising for land acquisition) that will have obvious payback benefits to the entire community.

5. CONCLUSION

The Southgate Pond/Chenay Bay area offers great potential to sustain a diversity of land and water use activities for residents and visitors of the St. Croix north shore. Management of this Area of Particular Concern must take into account the floodplain and potential coastal storm surge hazards which exist as a result of the low-lying topography and exposed coastline. Nevertheless, the area has already sustained considerable commercial development and is under pressure for additional development, both residential and commercial. If the present attributes of the area are to be preserved, serious attention must be given to ensure that the quality of existing developments is not degraded or that area residents are not disallowed access to the popular beaches and Southgate Pond.

Southgate Pond should be recognized in all future planning and permit decision-making as a valuable wildlife habitat and refuge for endangered species. In addition, Chenay Beach is a known nesting ground for three endangered species of sea turtles. Sound environmental management is not only critical for these species, however, as it must be seen as a cornerstone of sustainable economic development for this area, and indeed throughout the Territory.

The preservation and restoration of the eastern portion of Southgate Pond is an important recommendation in this APC Study and proposed management framework. Such efforts will not only assist to maintain critical wildlife habitat, but will offer a unique opportunity for island residents to enjoy the educational and recreational benefits that this ecotype has to offer. Developments anywhere within 150 feet of the eastern portion of the Pond should thus be closely monitored, and/or denied when direct or indirect impacts are identified. The Pond's biological

resources will in future years have enough to contend with natural hazards without additional man-induced impacts. If the currently predicted sea level rise scenarios eventuate, the Pond will undergo natural changes, and will depend heavily on the storm surge mitigative functions presently provided by the baymouth bar.

The Green Cay National Wildlife Refuge is a territorial and national treasure. Maintenance of the highest levels of coastal water quality is necessary, especially if the unique coastal habitats of the refuge are not to be compromised.

Finally, future planning and permitting decisions should allow for a separation of the various diverse interest groups that utilize the APC. Special attention should be given to the establishment of "passive recreation" zones, where swimming, sunbathing, snorkeling, and/or quiet enjoyment of the natural environment are all made available.

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