

Water Island Land Use Study and Plan



**University of the Virgin Islands
Eastern Caribbean Center
Conservation Data Center**

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U.S. Virgin Islands Governor
Honorable John P. de Jongh

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LIST OF ACRONYMS

CZM	Coastal Zone Management
COCS	Cost of Community Service
DH	Department of Health
DOI	Department of the Interior
DPNR	Department of Planning and Natural Resources
EAR	Environmental Assessment Report
EIS	Environmental Impact Statement
GIS	Geographic Information System
HPR	Housing Parks and Recreation
MOA	Memorandum of Agreement
P&P	Property and Procurement
PWD	Public Works Department
VIHFA	Virgin Islands Housing Finance Authority
VIPD	Virgin Islands Police Department
WMA	Waste Management Authority

GLOSSARY

Attribute join

The joining of attributes (descriptions) from one table (source table) to another table (destination table) using the relationship between variables with common values in both tables.

Destination table

The data table used to perform analysis.

Dry shrublands

Dry shrublands occur in dry locations at low elevations on all islands and offshore cays. These communities are at least 0.5 meters to 5 meters in height with 3 meter height typical. Shrubs are generally defined as multiple stemmed, bushy and interlocking in structure. Thorny shrubs and cactus species are common along with succulents in some locations.

Source table

The table containing the source data used to populate a destination table.

Spatial join

The joining of attributes (descriptions) from the table of one *theme* (source table) to the table of another *theme* (destination table) using the spatial relationship between the features in the two *themes*.

Theme

A collection of similar geographic features (the features are represented by one of three shapes point, line or polygon).

1. BACKGROUND

On July 12, 2005 the Legislature of the U.S. Virgin Islands enacted Bill Number 26-0033 and Governor Charles W. Turnbull approved this Bill as Act Number 6751 on August 11, 2005. This Act requires the Office of the Governor to transfer to the Virgin Islands Housing Finance Authority (VIHFA) thirty percent (30%) of two hundred acres (200) of real property on Water Island granted to the Government of the U.S. Virgin Islands by the Government of the United States Department of the Interior.

The Eastern Caribbean Center of the University of the Virgin Islands has been charged by the Office of the Governor with the task of completing a land use study of Water Island to be used in determining the opportunities for development on 200 acres of VI Government owned land recently transferred from the Federal Government, which includes the 30% mentioned above to be transferred to the VIHFA. The objective of this land use study is to assess the present land use on Water Island, determine the level of services and infrastructure needed to adequately support present and future residents and provide recommendations on the parcels on Water Island to be transferred to VIHFA.

The environmental information contained herein concentrate on physical and biological factors and issues of interest. This is an initial assessment of alternatives and not an Environmental Impact Statement (EIS) required for actual construction permits. Once the property or properties of interest have been identified, a complete Coastal Zone Management (CZM) Major Land and Water Development Permit Application including a comprehensive Environmental Assessment Report (EAR) will need to be completed as part of the application process.

The Memorandum of Agreement (MOA) calls for the study to identify optimal land use and land use options. Constraints of data, budget and time precluded a comprehensive analysis and weighting of use options. The Project Team also acknowledges the early directions proposed by the U.S. Department of the Interior and Water Island advocates for tourism and recreational development (U.S. Congress, 1985 & 1987). The Cost of Community Service (COCS) scenarios contained in this document is based on the contemporary "revealed preference" for residential uses, the stakeholders' expressed preferences, and common sense. It is possible that more in depth analysis and input from a much wider group of stakeholders would identify other options or change the options presented in this report; however, this lies outside the scope of this study. Nevertheless, some recommendations are identified to address relevant issues.

The identification of parcels to be transferred to the VIHFA is based on a spatial model which utilized *Geographic Information System* (GIS) technology to score the development suitability of each parcel. Rasch analysis was applied to develop measures and rank the development suitability scores of the parcels.

2. PROFILE OF PHYSICAL ENVIRONMENT

Water Island, the smallest of the four inhabited U.S. Virgin Islands, became an official part of the U.S. Virgin Islands in 1996 when control was transferred from the U.S. Government to the Territorial Government of the Virgin Islands. The island is located ½ mile south-southwest of Charlotte Amalie Harbor and is comprised of 492 acres (198 hectares). Water Island is 4 kilometers (2.5 miles) long by 1.5 kilometers (.94 mile) wide. The maximum elevation is 98.4 meters (300 feet) above mean sea level.

The island's cultural history is rich and includes Amer-Indians from the Preceramic and Ceramic cultures, who migrated to the Virgin Islands from coastal South America. The colonial history of Water Island begins in the 1670's with the Danish West Indies Company and continued under their control for the next hundred (100) years. The Plantation Era and the subsequent emancipation of enslaved Africans brought large changes to the island's natural terrestrial and marine resources as the original inhabitants and colonizers altered and exploited the land and seascape to meet their needs and the needs of the small emerging commercial ventures.

Farming, wood harvesting, livestock grazing, fishing, turtle hunting and limestone quarrying created significant stress on natural systems and led to the first major changes in the Water Island environment.

While the Water Island landscape has been significantly altered and disturbed in the past, a variety of common native plant communities exist, along with areas colonized and dominated by exotic plants. Predominantly a dry environment, the island has a different composition of plant communities from the larger and higher islands that surround it. The most common habitat type is *Dry shrublands*. In addition, sandy and rocky shore beaches,

woodlands, salt ponds and mangrove wetlands are also found and they create a very diverse and rich landscape. (see Map 2.1).



Figure 2-1 The Water Island shoreline is primarily composed of rocky beaches

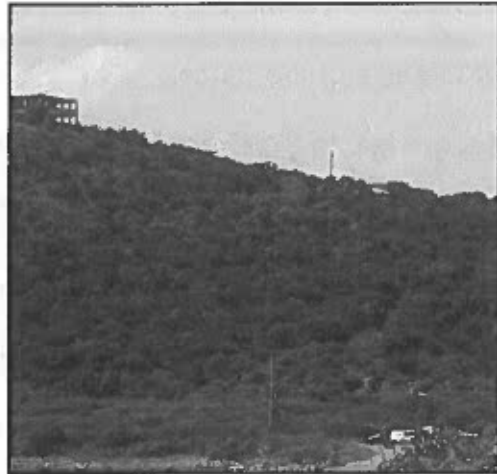


Figure 2-2 The Water Island landscape is primarily composed of dry forest and dry shrub land

The Water Island marine communities found just offshore are also abundant and important environments. There are extensive coral reefs, colonized hard pavement and coral-covered bedrock, especially along the east shores. Sea grass beds are common in many bays. In all, the marine environment surrounding Water Island is quite diverse and supports a rich flora and fauna important to the commercial fisheries of the Virgin Islands (Thomas and Devine, 2005). Several large bays Sprat, Flamingo and Honeymoon are ecologically important bays linked closely to adjacent terrestrial wetlands.

Undoubtedly the land use impacts on Water Island and St. Thomas have negatively impacted the marine resources surrounding Water Island. The coral reefs and seagrass beds are less extensive than previously observed. Any further changes in land use development must be considered with respect to the potential impact on marine resources.

2.1. Environmental Constraints

Parcel and Island Size – The size of Water Island at 492 acres is appropriate for the development of additional housing. The selection of the target properties for such development is more problematic as a result of other landscape constraints than as a result of the size of the parcels. The 200 acres is comprised of 58 parcels ranging from 188.66 square feet to 37.22 acres.¹ These land parcels are scattered around the island, generally in the southern 2/3 of the island (see Map 2.2). The quitclaim deeds transferring the real property from the Department of the Interior (DOI) to the Government of the U.S. Virgin Islands contains restrictive covenants. The restrictive covenants designated areas on Water Island as *permanent nondevelopment* and restricted development covenant (see Appendix B) As a result, the number of potential parcels for consideration is substantially reduced (see Table 2-1).

Table 2-1 Distribution of Government Owned Water Island Property by Development Designation

RESTRICTION	ACRES	%
No Restriction	92.9	46.0
Restricted Development covenant	31.8	15.7
Permanent Nondevelopment	77.3	38.3
TOTAL	202.0	100.0

¹ The total acreage calculation generated from GIS data (202.0 acres) is different from acreage in Act Number 6751 (200 acres). This is a result of map projection which is used to fit the earth's surface that is three-dimensional onto a flat surface that is two dimensional. A ground survey is considered the most accurate calculation of land acreage.

Access Constraints – While the distance of Water Island is relatively short to medical services, social services, utilities and other necessities on St. Thomas, access to adequate passenger ferry and barge services is a challenge. The current passenger and commercial off-loading areas are not located at points closest to the Charlotte Amalie harbor



Figure 2-3 Temporary dock at the Water Island passenger ferry dock area

thus, requiring more travel time to services in Charlotte Amalie. Access to Water Island is limited to several small launch/ferry boats to transport passengers. Automotive vehicles and equipment are carried over on a small, single vehicle barge and off-loaded at Flamingo Pond at a primitive shoreline ramp. Private sea vessels used for trips to St. Thomas are anchored or moored at the Flamingo Pond or the Passenger Ferry dock (see Figure 2-3). The parking area currently serving the Passenger Ferry dock during peak demand presents another challenge to accessing transportation. Additional housing units and residents will increase the demand for adequate passenger ferry and barge service.

Geology/Soils/Topography - Water Island is composed primarily of bedrock of volcanic origin, with a thin overlying layer of soil. The soil on the interior and higher elevations is Cramer gravelly clay loam (Dammann and Nellis, 1992).

The northwestern portion of the island contains the higher elevations, with the highest point being 294 ft. (89.37 m). The south and east coastline of the island (the windward side) has more cliffs.

Dammann and Nellis (1992) notes the occurrence of seven salt ponds on the islands, with the largest (Flamingo Pond) opened for use as a marina.

Figure 2-4 Windswept vegetation on the south east side of Water Island



Topography and Slope Constraints - Water Island, similar to the other islands in the U.S. Virgin Islands, has extremely steep slopes and varied topography throughout the island. Though its elevation is only 300 feet, the landscape undulates, rising and falling with many steep areas lying along the shore line. Many of the steep areas are precluded from development by the issues involved with topography, size of the parcels and access issues. Steep topography increases building costs and creates significant potential for erosion,

sedimentation and downstream marine community impacts. However, there are several sites on the island where the topography is more gentle or flat. These conditions are suitable for the construction of housing. Potential sites and topography will be discussed in following sections.

Downstream community constraints - The marine communities surrounding Water Island are abundant and diverse. Coral reefs, seagrass beds, colonized hardbottom and colonized bedrock shorelines are all densely populated with marine organisms. As the island lies offshore, exposed and cleaned by circulating ocean currents, the marine communities are likely less affected than mainland areas, especially on the shores farthest from inner Charlotte Amalie harbor. Sprat Bay and the entire southeast coast has a coral reef running parallel to the shoreline from about 100 feet just offshore to 1000 feet. Inside this, hardbottom pavement colonized by corals and other marine invertebrates is a dominant reef environment. Seagrass beds are dominant inside Sprat Bay, Honeymoon and the Flamingo Pond area. Any development in the adjoining coastal areas is likely to have a negative impact on the offshore marine resources, unless proper sites are chosen and the proper construction methods are used to protect these resources.

Landfill constraints - As a result of the Federal Government's ownership and use of Water Island for military purposes, there were a number of waste disposal sites on the island that were cleaned of potentially toxic materials. These areas may come into issue when the final site for the project is chosen and detailed land use evaluation occurs. In addition, on the south side of Flamingo Pond, a landfill and transfer station has been established, precluding use of certain parcels. Also in this area is an automobile graveyard created by the residents and Public Works staff accumulating scrap vehicles. There is likely a

significant chance that some toxic materials have leached into soils and sediments around the pond. These areas preclude development of housing, but also create landfill problems that need to be addressed now to meet current standards and addressed in greater detail for additional residential development. Waste removal will be a costly service.

Figure 2-5 Abandoned vehicles near the solid waste transfer station



2.2. *Natural Hazards*

The 1980 study identified the existence of “significant stress factors”, and advised that development on the island should not exacerbate those stresses. Persons testifying in the U.S. House of Representatives Hearings on Water Island also noted the existence of natural threats. These natural sources of threats include earthquakes, tsunamis, and tropical storms.

Earthquake activity is an environmental constant in the U.S. Virgin Island (Appendix C), with three (3) minor quakes since January 2007 registering above magnitude 3:

- January 10, 3:07 a.m. magnitude 3.1, 75 miles north of Charlotte Amalie;
- January 7, 2:15 Atlantic Standard Time, magnitude 4.4, 63 miles north of Charlotte Amalie; and
- January 6, 23:43 Atlantic Standard Time, magnitude 4.5, 49 miles north west of Charlotte Amalie.

Most of the earthquakes are centered north and north-west of Charlotte Amalie, and take place at relatively shallow depths. In addition to the potential damage from the quakes, they also have the potential to generate tsunamis.

The largest tsunami recorded in the U.S. Virgin Islands occurred on November 18, 1867, and is referred to as the 1867 Virgin Islands Tsunami (Appendix D). The tsunami was generated by a magnitude 7.5 earthquake in the Anegada Trough, located between St. Croix and St. Thomas. The report of the tsunami included eyewitness accounts of a wave approximately 12.1 meters high at the southern point of Water Island and 4.5-6.1 meters high at Charlotte Amalie. The tsunami caused significant damage to buildings along the waterfront on St. Thomas.

Tropical storms present a more significant threat, given the frequency and strength of hurricanes passing through the Virgin Islands. Since 1989, the Virgin Islands have weathered ten (10) tropical storms, six (6) of which attained hurricane strength, with Hurricane Hugo (1989) classified as a Category 4 hurricane and Hurricane Lenny (1999) classified as a Category 5 hurricane (Appendix E). These storms created severe destruction in the Virgin Islands, including the destruction of the hotel and many of the residences on Water Island. Due to storm damage, the number of housing units on Water Island decreased from 165 in 1990 to 148 in 2000.

2.3. Zoning

The Virgin Islands code Title 29 Public Planning and Development, Chapter 3 of the Virgin Islands Zoning and Subdivision Law has established 18 zoning designations. Water Island has only 2 of the 18 zoning districts – R-1 Residential Development – Low Density and W-1

Waterfront – Pleasure. (see Map 2.4) These zoning designations (districts) establish standards and policies concerning the development of land:

R-1: RESIDENTIONAL – LOW DENSITY is established primarily for residential purposes. The minimum lot size is one-half (1/2) acre. The maximum residential building height is limited to two (2) stories.

W-1: WATERFRONT – PLEASURE is established for the purpose of meeting the recreation needs of residents and visitors of the Virgin Islands. The standards for this designation provide for mixed uses – residential and retail. However, it also protects private residential areas from the intrusion of commercial and industrial uses. Hotels and Guesthouses are permitted uses with conditions set forth in Title 29 sections 231 and 232. The maximum building height in this zoning district is three (3) stories.

2.4. *Existing Land Use and Infrastructure*

The existing land uses on Water Island include low and medium density residential, public facilities, retail/commercial and hotel/resort (historical). In general, the residential homes are sited along older roadways and paths built to no proper standards. The roads are too narrow, unpaved or potholed in many cases, and overgrown by roadside brush and other vegetation. In several places, cars cannot adequately pass, corners are blind and roads form a spidery maze, difficult to navigate. The Cost of Community Service section of this report will focus more specifically on infrastructure needs.

There are several commercial businesses on the island. General businesses include small commercial operations for food concessions. The operation of bicycle tours is a major business activity on Water Island. This evident by the investment made to install bicycling facilities and transportation vehicle.

Figure 2-6 Directional sign on Water Island bike tour path



Figure 2-7 Bike tour facility and transportation

Since 2000, only two (2) Major Permits have been issued for projects on Water Island:

- Re-construction of Water Island Ferry Dock by the Department of Public Works, 2001; and,
- Construction of a Low-Impact Campground by V.I. Campgrounds, Inc., 2006.

Conditions to protect the environment from the negative impacts of these two developments focused mainly on sedimentation control measures (Appendix F).

The Minor Permits issued have largely been in response to proposals for reconstruction of damaged homes, addition to homes, and construction of new homes. During the period 2000-2006, thirty one (31) minor permits were issued for residential development. These fell into the categories shown by the table below.

Type of Activity	Number of Permits
Addition to existing residence (pool, storage room, etc.)	7
Addition of more rooms to existing residence	4
Restoration/renovation of existing residence	6
Construction of new residence	8
Improvement of roadway, wall, or other infrastructure	4
Repair of damage to existing commercial structure	1
New mixed residential and commercial (workshop/office)	1
TOTAL	31

The special conditions for the minor permits are fairly standard, and generally include the following:

- a. The Division of Coastal Zone Management shall be notified at least forty-eight (48) hours before work commences.
- b. A Coastal Zone Management permit placard shall be placed in a conspicuous location on site as soon as work commences.
- c. This permit is valid only for work as stated in Paragraph 2 "Scope".
- d. A building permit shall be obtained prior to commencement of work.
- e. Silt fences shall be installed and properly maintained around the work area.
- f. A grey-water system must be used in place of a septic tank and leach field².
- g. Upon the discovery of any archeological or historical site, or human burial site or remains upon private lands, the owner or his representative shall immediately notify the State Historic Preservation Office verbally and in writing.

The Division of Coastal Zone Management notes that the soils on Water Island have low water retention capacity, and has stated a concern regarding the disposal of sewage effluent. The current residences use primarily a multi-flow system for sewage treatment, though the Division is encouraging the use of constructed wetland systems for sewage treatment (personal communication). The hearings in the U.S. House of Representatives also identified sewage disposal from the (now destroyed) hotel as a major cause of concern. Given the low water retention of the soil, the nature of the underlying bedrock, and the low-lying nature of the island, any major development will have to provide some form of municipal/communal sewage treatment facility.

With the exception of the stated concern of sewage disposal from the hotel, there is no available documentation that provides any information on the impacts of development activity on the historical and environmental features of Water Island.

² This specific condition is in relation to the proposed use of the structure as a workshop.

2.5. General Description of the 200 acres of Properties of Interest

Of the 200 acres on Water Island that are currently owned by the Territorial Government of the Virgin Islands, 30% or 60 acres have been designated to be transferred to the Virgin Islands Housing Finance Authority. The purpose of this land use study is to identify these parcels and perform a limited environmental and infrastructure analysis on this land to prioritize potential parcels for possible future development.

A study of this scope must make certain assumptions regarding the increase in number of residents and proposed number of units to be built on a given number of parcels. Cluster development is suggested as this can reduce construction costs, reduce impact to natural resources and improve the ease with which services can easily be provided. Otherwise, some parcels of interest may be too small to accommodate the increase proposed. Currently, the number of island residents is 161 persons, many of whom are part-time residents. An increase of 25% in number of residents would translate to approximately 40 additional persons. An increase of 50% of the current population would mean more than 80 new residents. While this is a small number, it is a significant increase in local numbers. Any increase in number of residents in government - built housing will necessitate an upgrade to many of the island services, especially, in the areas of transportation and health care/emergency services. A large increase in residents will likely increase the demand for public services; therefore, public services must improve to meet the additional demand.

On September 5, 2006, the staff of the University of the Virgin Islands –Eastern Caribbean Center/Conservation Data Center (UVI-ECC/CDC, conducted a site assessment and field trip to Water Island to gather data for use in this study. After careful consideration

of all potential parcels on Water Island, the following are the findings with respect to potential parcels and the environmental factors of importance.

2.6. *Field Observation of Parcels*

Of the 58 parcels spread across the island, three potential locations, based on field observation, are identified as promising possibilities for VIHFA development (see Map 2.5). Most of the other sites and parcels have significant constraints relating to steepness of slopes, size of the parcels, access to the parcels, landfill issues, infrastructure issues and downstream environmental issues. The three parcels with potential are located in the same general area and are suitable for the placement of multiple units. Only further analysis of the costs of such construction, infrastructure and the number of units can determine the best possible alternative solutions for this effort.

Site 1 – Former Hotel Resort

This area is comprised of multiple parcels and is the site of a former hotel (Water Island Hotel and Beach Club contained 122 rooms in 1984. Minimal construction preparation would be needed for this site. The site is relatively flat. It has a 0-3% slope gradient with no topographic constraints with respect to drainage. The site is cleared of most vegetation and in close proximity to utilities and other essential services. The existing ferry dock, deli, fire department, waste transfer station, beach facilities and the barge landing docks at Flamingo Bay are all within a radius less than a mile from Site 1. Existing road foundation minimizes site disturbance and associated environment impacts.

No significant plant or animal community has been observed on Site 1. The present plant communities are scrub thicket and dry shrub lands with a few larger trees. Though some species of bird undoubtedly breed at this site no nesting was observed during the

field survey. In addition, no rare plant species were seen. However, an Environmental Assessment Report (EAR) would be required for the approval of a Coastal Zone Management (CZM) development permit. Previous work by Woodbury et al., 1992, provided a flora and fauna list for the island. The list contains a number of uncommon plants and animals that may be found on the sites.

Site 2 – Former Water Island Villas Site

To the east of Site 1, the former Water Isle Villas site and the surrounding upland parcels represent another good choice alternative. The multiple parcels are moderate in size have moderate slopes, some existing buildings and some infrastructure. There are existing roads and accesses. Site 2 like Site 1 is in close to all the essential services on Water Island.

Site 3 Tract (B)

Located to the north of Site 2 is a 4.0 acre vacant tract. The road serving this tract is not paved but graded and accessible. Essential services are within a half mile of Site 3. The vegetation has been disturbed. No significant or irresolvable drainage/flooding issues exist. Soils on the site are suitable for limited development.

3. PROFILE OF POPULATION AND HOUSING

The following tables provide a historical profile of changes in population and housing which have occurred on Water Island between 1980 and 2000.

Table 3-1 Population and Housing Profile for Water Island, Virgin Islands 1980-2000

	1980		1990		2000	
		%		%		%
Total population	152	100.0	172	100.0	161	100.0
Gender						
Male	74	48.7	101	58.7	91	56.5
Female	78	51.3	71	41.3	70	43.5
Age						
Under 5 years	6	3.9	3	1.7	4	2.5
5 to 9 years	6	3.9	4	2.3	11	6.8
10 to 14 years	5	3.3	7	4.1	6	3.7
15 to 19 years	6	3.9	5	2.9	5	3.1
20 to 24 years	11	7.2	8	4.7	3	1.9
25 to 34 years	33	21.7	32	18.6	9	5.6
35 to 44 years	17	11.2	45	26.2	28	17.4
45 to 54 years	19	12.5	18	10.5	65	40.4
55 to 59 years	14	9.2	9	5.2	13	8.1
60 to 64 years	8	5.3	12	7.0	9	5.6
65 years and over	27	17.8	29	16.9	8	4.9
Median age (years)	38.7	(X)	42.1	(X)	47.9	
Housing Units	133	100.0	165	100.0	148	100.0
Occupied	78	58.6	86	52.1	80	54.1
Vacant	55	41.4	79	47.9	68	45.9
Owner-occupied	38	48.7	38	44.2	49	61.3
Renter-occupied	40	51.3	48	55.8	31	38.8
						0.0
Households	78	100.0	86	100.0	80	100.0
Family Households	42	53.8	49	57.0	48	60.0
Non-Family Households	36	46.2	37	43.0	32	40.0
Median Household Income	\$ 16,667	(X)	\$ 38,738	(X)	\$ 30,357	
STT Median household Y (dollars)	\$ 11,534		\$ 24,619		\$ 26,893	
Race						
Black	16	10.5	12	7.0	15	9.3
White	130	85.5	160	93.0	141	87.6
Other ¹	6	3.9	0	0.0	5	3.1
(X) represents Not applicable						
¹ Includes data for the American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, and Some other race populations.						
Source: The U.S. Census Bureau						

There has been a significant shift in the structure of the population and housing profile for Water Island since 1990. In earlier decades, for example, Water Island, with a hotel, was more a seasonal residential community, with only 44% owner occupied housing. In the 2000 Census, this value jumped by nearly 50%, as owner-occupied housing equaled 61%, indicating a likely decline in seasonal visits by absentee owners. Also, the median household income for Water Island in 1990 equaled \$38,738 and far exceeded the \$24,619 median household income for the St. Thomas/St. John district. However, in the 2000 Census, a significant drop in the Water Island median household income was revealed as it equaled \$30,357, falling by \$8,381 or 22%, while the median household income for the St. Thomas/St. John district showed a slight increase of \$2,274 to \$26,893 declining by 9%, thereby revealing a much narrower gap.

Between 1990 and 2000 the population and housing numbers for Water Island declined while these numbers increased for St. Thomas during the same period. The number of persons on Water Island (161) represents a 6% decline from the 1990 Census (172). Conversely, St. Thomas experienced a 6.3% growth. The number of persons Age 45 years and older showed the greatest change for Water Island (Age 45 to 54 (261%)) and St. Thomas (Age 55 to 59 (63%)).

Finally, during the decade of the 1990s, it appears that destruction caused by Hurricane Marilyn had the additional impact of reducing the number of housing units from 165 to 148. In sum, the Water Island community appears to have transformed from a more exclusive, absentee home owner, seasonal residential community to a smaller, more owner-occupied residential community exhibiting income levels closer to those found on St. Thomas/St. John.

4. STAKEHOLDER SUMMARY

OVERVIEW

On Saturday, October 14, 2006 residents of Water Island and a select group of government agencies participated in a stakeholder meeting at Honeymoon Bay Pavilion.

The presence of representatives from government agencies was very well received, and the informal exchanges between them were, at times, intense, yet cordial.

Below are responses, recorded without evaluation, to the question asked by the meeting facilitator:

“What services and improvements would have to be in place for you to enjoy a desirable quality of life on Water Island in 5 years?”

A. Character of Community

1. Still self-sufficient in most ways
2. Carefully managed commercial development that fits in with what we want Water Island to look like and be.
3. NO commercial development – it's fine the way it is (*minority view*)
4. Want it to remain primarily a residential community
5. Water Island as an educational tool in regards to alternative energy, recycling, eco-camps, community planning
6. Would like there to be a Church (*no denomination specified*)

B. Utilities

1. Electricity: Electricity that is stable; lessen delays in restoration; affordable /lower cost
2. Availability of potable water
3. Reliable Transfer Station. Do not want a Virgin Islands Waste Management Authority collection system
4. Fuel and Gas Depot
5. Utilities placed underground
6. Eyesores removed

C. Transportation

1. Vehicle: Still able to use Golf Carts– Grandfather in their licenses (are currently unlicensed –Residents think this was addressed in Transfer Deed, Department of Property and Procurement said “No”.)
2. Roadways: Guard rails; bush cut, potholes fixed, create a traffic circle at ferry dock intersection, roadways widened, easements, and regularly maintained.
3. Do not want street lights installed
4. Need some signage and speed bumps
5. Boat: Decent Ferry Dock; Dingy docks on the Water Island and St. Thomas sides; Moorings with Pump-Out Facility

D. Public Services

1. Beach Management Authority akin to Magen’s Bay Authority
2. Security for parked cars on the St. Thomas side
3. Need flow of “day-trippers” to be monitored by Tourism or Department Planning Natural Resources (remember Trunk Bay)
4. Search and Rescue volunteers need equipment and training, for health emergency and fire.
5. Peace Officers for the beach to enforce relevant laws.
6. Paramedic support
7. An Administrator for Water Island and a dedicated budget line for services
8. Assistance to establish Recycling programs
9. Need a Review of Zoning
10. Airspace restriction needs to be reviewed and enforced from standpoint of emissions, noise, and safety
11. Territorial Emergency Operations Plan and Virgin Islands Territorial Emergency Manage Agency need to define plans for Water Island

5. THE COST OF COMMUNITY SERVICES FOR WATER ISLAND, US VIRGIN ISLANDS

One important element of the public debate over appropriate land use policy is whether or not increased local government expenditure on community services is required to implement a particular land use policy. More specifically, are there predictable and significant changes in the cost of community services needed to accommodate increases in residential and commercial development.

The objective of this analysis is to provide an estimate of the Cost of Community Services currently and to be offered in the future by the Virgin Islands government under three development scenarios. Specifically, recent territorial legislation transferred 60 of the approximately 200 hundred acres of Water Island land owned by the US Virgin Islands government to the VI Housing Finance Authority (VIHFA). The legislative intent is to provide assistance to the VIHFA as they consider plans for moderate income housing and/or other commercial opportunities. This analysis is part of a larger study on land use alternatives for the 60 acres of land to be transferred to the VIHFA. Hence, for this exercise, three scenarios of near term housing and residency development are offered for consideration. The impact on the value of community services is estimated for each scenario. Other portions of the larger study focus on other variables affecting the physical and social environmental impacts of these alternative scenarios. The analysis presented here employs a methodology to measure the net cost of community services (COCS), an analysis tool developed by the American Farmland Trust.

The most common question to be answered by a generic COCS study is whether or not the property taxes and other revenues generated by alternative land uses exceed the

amount of publicly-provided services under each alternative. Alternative uses of the geographic area under consideration contribute more or less than a dollar for each dollar of public service provided. Unlike ordinary COCS studies, in the case of Water Island, a comparison of alternative land uses is not the issue for a basic common sense reason; because of geographic conditions only under the most remote circumstances would commercially feasible agricultural or industrial activities be undertaken there.

The issue here is confined to estimating, in advance of public policy development, the impact on the value of community services to be offered under alternative scenarios considering the number of additional housing units and population. More generally, the interest here is on the social, environmental and economic impact of alternative intensities of housing and the resulting residential population.

For public services logically to be provided on Water Island that are not now being offered, interviews were held with responsible public officials to learn of methods by which a budget for such services could be estimated. For public services currently provided, in most all cases, there are no budgetary breakouts; hence, interviews were still required. The following three scenarios were developed to allow for these considerations and comparisons.

Scenario 1. Status Quo – no additional housing or population – essentially, because the full array of public services has yet to be offered on Water Island, an estimate of the base value of that offering provides an understanding of the foundation upon which alternative development scenarios contributed by the Housing Finance Authority will grow.

Scenario 2. HFA sponsored housing of 20 units (no specific form) resulting in 50 additional residents on Water Island.

Scenario 3. HFA sponsored housing of 40 units (no specific form) and a small hotel up to 50 rooms, resulting in 100 additional residents.

This study does not deal, in any way with the social or environmental impact of these housing/population scenarios on Water Island. Neither does it focus on the more narrow issue of whether or not these alternative land-use intensities "pay their own way" or "not". Therefore, it is understood, *ex ante*, that there is neither presumption nor suggestion of a balancing act or requirement that the local budget be an overriding priority. Indeed, one of the primary functions of community government is to redistribute local financial resources such that services desired by citizens are supplied, *even when those services cannot pay for themselves*. Determination of the optimal distribution of those resources is a public policy issue. This report fits into that process wherein such issues are resolved by shedding light on the relative costs of providing public service under the alternative scenarios as noted above.

5.1. Methodology

The basic approach used in this report is quite simple. The data gathering process was carried out, as noted above, in conjunction with a series of telephone and in-person interviews among a variety of local officials responsible for and knowledgeable about the workings of specific government departments.

Once revenues and expenditures were allocated to the scenarios, a ratio of revenues to expenditures was computed for each. A revenue-expenditure ratio greater than one (1) indicates that that scenario's contribution to the public purse exceeds its demands for public funds. Conversely, a revenue-expenditure ratio less than one indicates

that a scenario's demand for publicly financed services exceeds its contribution to local public finance.

As noted above, the allocation of these data to specific sectors was done in consultation with a variety of local officials (Appendix G). In many of these cases, we relied on a local official's best guess of how their department's efforts would be budgeted was required.

Property tax revenues were estimated for a scenario based upon reasonable and transparent assumptions using the 2005 property tax assessments. The results are shown in the tables below.

Table 5-1 Scenario 1 - US Virgin Island Community Service Expenditure/Revenue

<u>Expenditure Item</u>	<u>Capital Expense</u>	<u>Annual Expense</u>
Public Safety	\$271,256	\$446,000
Fire Protection	\$140,000	\$525,000
Auto Inspection		\$ 50,000
Street/Road Maintenance		\$ 36,000
Street Signs/Guard Rails/Culverts	\$240,000	\$2,000
Docks	\$1,400,000	\$280,000
Solid Waste	\$50,000	\$ 60,000
Electrical Service	0	0
Public Health	\$790,000	\$200,000
Culture/Recreation		\$5,000
TOTAL	\$2,891,256	1,604,000

<u>Revenue Item</u>	
Property Tax	\$274,170
Vehicle Registration	\$9,000
TOTAL	\$283,170

RATIO – Revenue/Expenditure \$283,170/\$1,604,000 = 0.18
--

Water Island Land Use Study and Plan**Table 5-2 Scenario 2 - US Virgin Island Community Service Expenditure/Revenue**

<u>Expenditure Item</u>	<u>Capital Expense</u>	<u>Annual Expense</u>
Public Safety	\$271,256	\$446,000
Fire Protection	\$140,000	\$525,000
Auto Inspection		\$ 50,000
Street/Road Maintenance		\$36,000
Street Signs/Guard Rails/Culverts	\$240,000	\$2,000
Docks	\$1,400,000	\$280,000
Solid Waste	\$300,000	\$150,000
Electrical Service	0	0
Public Health	\$790,000	\$200,000
Culture/Recreation		\$ 60,000
TOTAL	\$3,141,256	\$1,749,000

<u>Revenue Item</u>	
Property Tax	\$277,546
Vehicle Registration	\$10,200
TOTAL	\$287,746

RATIO – Revenue/Expenditure \$287,746/\$1,749,000 = 0.16
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Table 5-3 Scenario 3 - US Virgin Island Community Service Expenditure/Revenue

<u>Expenditure Item</u>	<u>Capital Expense</u>	<u>Annual Expense</u>
Public Safety	\$271,256	\$446,000
Fire Protection	\$140,000	\$525,000
Auto Inspection	0	\$ 50,000
Street/Road Maintenance	0	\$ 36,000
Street Signs/Guard	\$240,000	\$2,000
Docks	\$1,400,000	\$280,000
Solid Waste	\$300,000	\$200,000
Electrical Service	0	0
Public Health	\$790,000	\$200,000
Culture/Recreation	0	\$100,000
TOTAL	\$3,141,256	\$1,839,000

<u>Revenue Item</u>	
Property Tax	\$280,922
Vehicle Registration	\$20,400
TOTAL	\$301,322

RATIO – Revenue/Expenditure	\$301,322/\$1,839,000 = 0.16
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5.2. Results

The most meaningful result of this exercise is that for the three scenarios indicated, there are likely to be only marginal changes in the assessment of public services required to properly serve the residents of Water Island. No individual interviewed felt that adding 50 or even 100 additional residents to the approximate 150 now in residence would necessarily create more than the relatively small changes indicated in these scenarios.

**6. SPATIAL MODEL TO SELECT PARCELS
ON WATER ISLAND
FOR TRANSFER FROM THE GOVERNMENT OF THE U.S. VIRGIN ISLANDS
TO THE VIRGIN ISLANDS HOUSING FINANCE AUTHORITY**

The proper allocation of land for use contributes to the economic development of a community as well as to the reclamation and protection of natural resources. The development constraints of a location should always be considered when selecting a site for the settlement of humans. (Gupta, 2003) Factors to be considered include:

1. The physical environmental constraints of a location e.g. Flood hazards, soil type, slope; and,
2. The proximity of a location to public services e.g. water, sewer, educational and medical

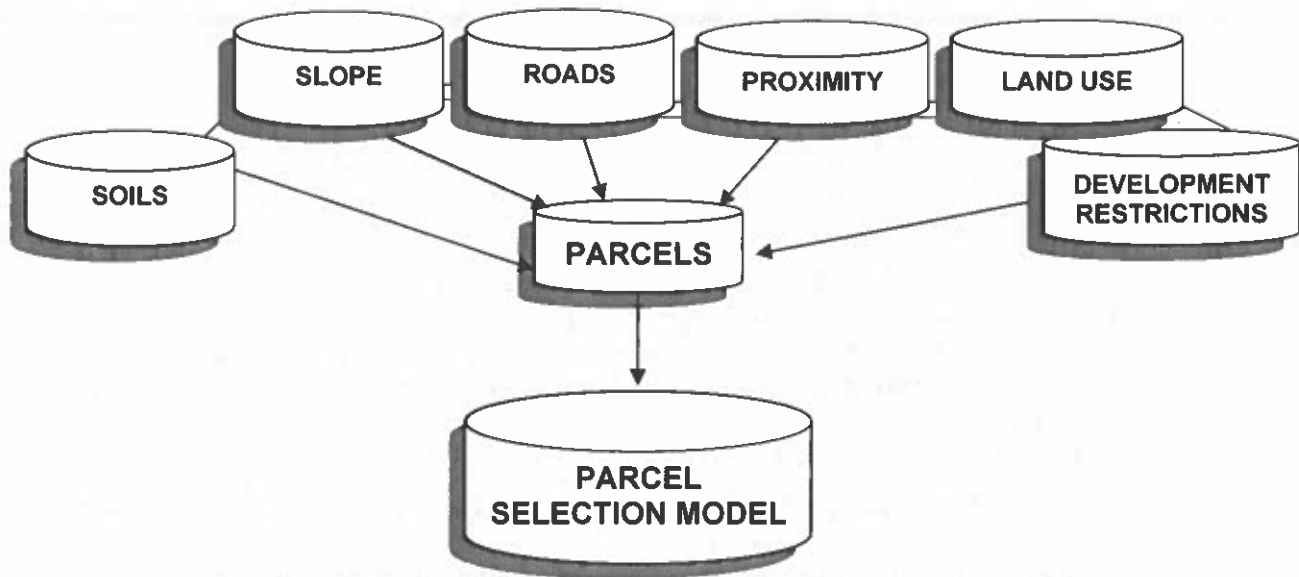
The surface area for all of these factors could be measured and used to create a layer of spatial data. Associated with these spatial layers are various characteristics which when analyzed together the results yields information needed for efficient planning and management of resources. Geographic Information Systems (GIS) technology is an effective tool for spatial analysis because it is capable of organizing, storing, manipulating, and displaying spatial and non-spatial data.

The spatial model for this project is designed to identify lots that will directly benefit the clients of the Virgin Islands Housing Finance Housing Authority without adverse impacts on current Water Island residents and the physical environment. Data on development restrictions, land use, soils, slope (percent), roads and proximity to points of entry are combined for ranking the lots for selection.

6.1. *Design of the Model*

The model is built and run in ESRI ArcGIS 8 and ArcView 3.2 GIS software. The Winstep statistical software was also utilized to apply a *Rasch* analysis to assess the

reliability and validity of each parcel development suitability score. The data used in the model is a combination of vector and raster format. The model consists of seven (7) main components:



6.1.1. Parcels

The *parcel* component was created by generating a centroid (a point in the center of a closed geometric feature [polygon]) for each lot in the Tax Assessor Parcel data layer. The *parcel* point layer serves as the **destination table** for the spatial model. The GIS ID attribute from the polygon parcel data layer is maintained in the point layer in order to permit an **attribute join** with the polygon layer.

6.1.2. Soil Index

The soil index is derived from the U.S. Virgin Islands 1993 Soil Survey which is a publication of the National Cooperative Soil Survey. This survey contains limitation ratings for soils and how they affect excavations, buildings (residential and commercial) streets and landscaping. The level of a water table and depth to bedrock all affect the cost of construction. The level of a water table contributes to an area flooding, and the

ground shrinking and swelling, which crack road surfaces and compromise foundation of buildings. The depth to bedrock influences the ease of excavation.

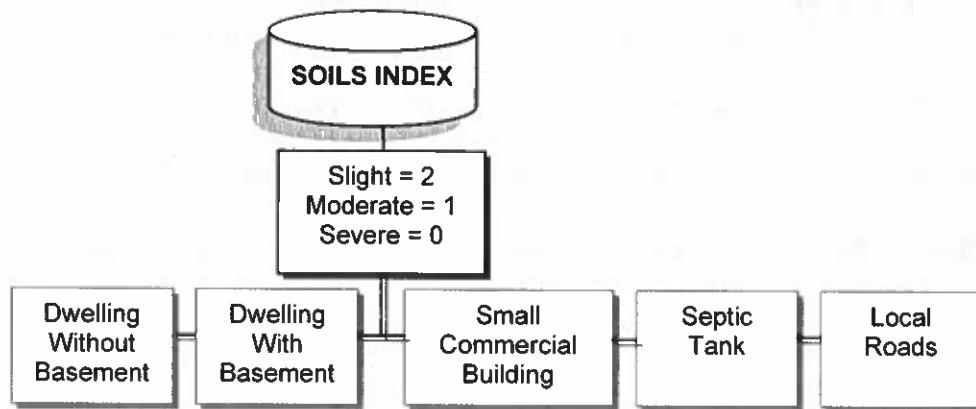
The limitations are considered:

[Slight = 2] if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome;

[Moderate = 1] if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and,

[Severe = 0] if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

The soil index is comprised of limitation ratings for dwellings without basement, dwellings with basement, small commercial buildings, septic tanks and local roads.



A spatial join was used to assign the soil index to the *parcels* attribute table.

6.1.3. Slope Index

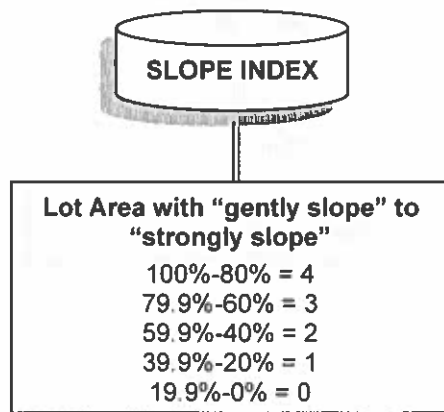
The slope index is derived from a slope analysis based on spot elevation data acquired from the U.S. Army Corp of Engineers. A digital terrain model (DTM) with a 15 meter grid cell size was generated utilizing ESRI ArcView 8 Spatial Analyst. The DTM was

used to calculate percent slope. *Slope* is the rise of a land surface from a level point to a high point. A percentage of slope is the vertical distance divided by horizontal distance, and multiplied by 100. For instance, a slope of 30 percent is a drop of 30 feet in 100 feet of horizontal distance.

The slope layer was classified into four classes:

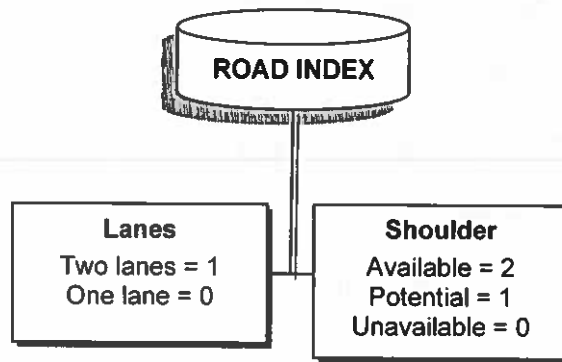
- | | |
|----------|------------------|
| 1) 0-3% | Nearly level |
| 2) 3-8% | Gently Slope |
| 3) 8-35% | Strongly Slope |
| 4) > 35% | Very Steep Slope |

The proportion of the lot area in each class of slope is calculated for each of the subject lots in this project. The slope for the subject lots is created by using the parcels polygon to clip the slope layer. The slope index value is based on the proportion of lot area in the "gently slope" to "strongly slope" class (3.1% slope to 35% slope).



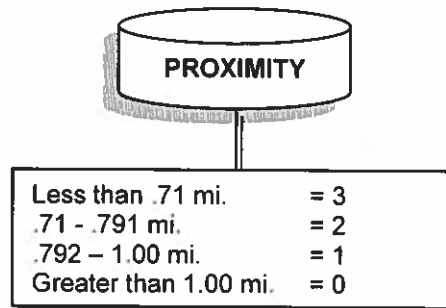
6.1.4. Roads Index

The roads index is a combination of existing roads characteristics - number of lanes and the availability of a road shoulder with a safe pull off area. The steepness of areas adjacent to existing roads is the determinant of the road shoulder score.



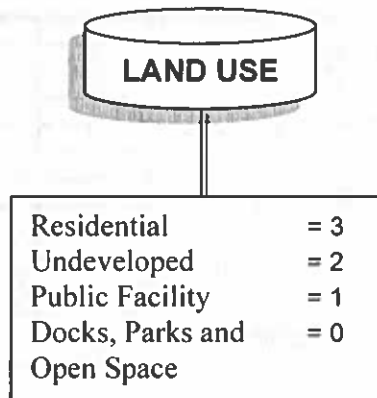
6.1.5. Proximity Index

The proximity index is derived by utilizing the Distance 2 ArcView extension tool to calculate the distances of the parcel point layer from the two public points of entry to Water Island – the Deep Water Dock and the Public Ferry Dock. The SPSS software was used to identify four classes of proximity:



6.1.6. Land Use Index

The land use index is based on a 2006 land use inventory. The following scheme was used for scoring the various land uses found on Water Island:

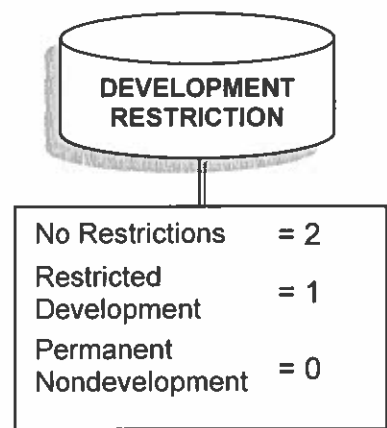


6.1.7. Development Restriction

The development restriction index scoring scheme is based on parcels with no covenant restrictions and the two designations outlined in the 1996 and 2005 transfer covenants and restrictions documents:

Permanent Nondevelopment: (if not already developed) lots are restricted from development or removal of vegetation cover without consultation and approval from the U.S. Fish and Wildlife Service and the Virgin Islands Division of Fish and Wildlife; in addition with the Virgin Islands State Historic Preservation Officer.

Restricted Development: removal of vegetation on these lots is limited to the footprint of a building or driveway and a performance based standard for outdoor lighting.



6.2. Results

The score on each component was combined to give each parcel a development suitability score. The Rasch analysis was applied to assess the reliability and the validity of a parcel being selected compared to their scores on each of the development suitability items. The parcel with a suitability measure higher than another is considered higher for selection than the other. The results of the analysis are shown in Table 6-1. The top ranking 35 parcels were selected to achieve 60 acres for transfer to the Virgin Islands Housing Finance Authority (see Map 6.1).

Table 6-1 Summary of Parcel Selection Rasch Analysis

RANKING	PARCEL ID	SUITABILITY SCORE	MEASURE
1	11201	12	63.58
2	11117	11	53.99
3	11172	11	53.99
4	11179	11	53.99
5	11392	11	53.99
6	11137	10	48.44
7	11336	10	48.44
8	11389	10	48.44
9	11393	10	48.44
10	11428	10	48.44
11	11196	9	44.54
12	11309	9	44.54
13	11320	9	44.54
14	11346	9	44.54
15	11357	9	44.54
16	11366	9	44.54
17	11368	9	44.54
18	11377	9	44.54
19	11384	9	44.54
20	11385	9	44.54
21	11418	9	44.54
22	11448	9	44.54
23	11041	8	41.38
24	11258	8	41.38
25	11273	8	41.38
26	11301	8	41.38
27	11325	8	41.38
28	11345	8	41.38
29	11356	8	41.38
30	11358	8	41.38
31	11365	8	41.38
32	11378	8	41.38
33	11381	8	41.38
34	11422	8	41.38
35	11426	8	41.38
36	11406	8	41.38
37	11127	7	38.56
38	11238	7	38.56
39	11257	7	38.56
40	11302	7	38.56
41	11350	7	38.56
42	11402	7	38.56
43	11412	7	38.56
44	11413	7	38.56
45	11416	7	38.56
46	11446	7	38.56
47	11447	7	38.56
48	11212	6	35.85
49	11221	6	35.85
50	11230	6	35.85
51	11240	6	35.85
52	11369	6	35.85
53	11383	6	35.85
54	11449	6	35.85
55	10988	5	33.06
56	11235	5	33.06
57	11274	4	30.00
58	11133	3	26.37

7. RECOMMENDATIONS

The following recommendations were identified based on input from members of the team, the general public and staff from participating government agencies. These recommendations are organized by general elements of a land use plan. Actions recommended are for the purpose of avoiding lengthy and costly approval and development processes.

Planning

1. Conduct ground surveys to establish legal boundaries for properties, based on legal deeds and title. This work should include the subdivision of "Tract B" to match the boundaries delineated on the "Selected Lots for Transfer" map.
2. Assign staff from key agencies (P&P, VIPD, DH, DPNR, PWD, WMA and HPR) to an interagency team chaired by the Water Island Administrator to enhance the delivery of government service to Water Island.
3. Develop a comprehensive disaster management plan for Water Island.
4. Conduct a more comprehensive analysis of the economics of development scenarios including:
 - Recreational facilities aimed at local resident use
 - Government-owned/private managed condominium/vacation rental units, or health and wellness retreat facility
5. Expand the economic analysis to include cost of living trade off
 - True cost of living, trade offs for residents of WI , e.g., religious worship, social activities, additional cost for home maintenance and appliance repair, business /government/ health services require inter-island travel (on resident-owned water transportation) regardless of the weather
6. The Virgin Islands Housing Finance Authority should prepare a Master Plan for the 60 acres prior to the preparation of detailed architectural or engineering drawings.

Parks & Open Space

7. Lots designated non-development should be added to the Territorial Park System list pursuant to Title 32 Chapter 2a and be included in the Territory's comprehensive management plan for parks and natural areas:
 - Area J
 - Area Y
 - Lot 279
 - Tract D
 - Tract F

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8. Tract A (Fort Segarra) should be transferred to the VI Historic Preservation Office for development and management
 9. The DHPR should develop a plan to provide and maintain a wide range of recreational opportunities within areas designated as green space.
-

Waste Management

10. VIHFA should adopt a communal sewage disposal system or constructive wetland to minimize the negative impact of sewage.
-

Transportation

11. Bicycling as a means of transportation and recreation should be accommodated as part of the DPW road network development and maintenance plan
-

Water

12. The VIHFA should explore the renovation of the Catchment to provide potable water for residents and visitors of Water Island.

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