Spatial Data Policy
Department of Planning and Natural Resources
U.S. Virgin Islands

October 2, 2009

Prepared in partnership with

The Nature Conservancy
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NOAA CORAL REEF CONSERVATION PROGRAM

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TABLE OF CONTENTS

Signature Page....2
Quick Reference Guide....3
GIS Policy Group....4
GIS Work Group....4
Data Exchange....4
Datum and Projections....4
DPNR Framework Data....5
Directory Structure....5
Naming Conventions....6
Available Imagery....6
Metadata....6

APPENDICES

A: Definitions of Commonly Used Projections and Datum....8
B: Directory Structure....10
C: Naming Conventions for USVI Rocks and Cays....13
D: GIS Acronyms and Definitions....15

References....19

LIST OF TABLES AND FIGURES

Figure 1: View of the GIS Directory Structure
Figure 2: Expanded View of Data Folder
Figure 3: Indication of how point locations are translated from a datum to a projection. .

Table 1: Metadata Mandatory and Conditional Elements
Table 2: Naming Conventions for USVI Rocks and Cays

I, Commissioner Robert S. Mathes, based upon the recommendation of the GIS Workgroup do hereby endorse this document as the official GIS Policy for the Department of Planning and Natural Resources

APPROVED **DATE** 12/11/09

GIS Workgroup

Aaron Hutchins
TNC

Alexandra Holecek
DPNR - Environmental Protection

Alexis Doward
DPNR - Building Permits

Anita Nibbs
DPNR - Environmental Protection

Hector A. Squiabro
DPNR – Information Technology

James Byrne
TNC

Jeanne Brown
TNC

Jennifer Valiulis
DPNR - Fish and Wildlife

Julius Jessup
DPNR - Planning

Kevin Dupigny
DPNR - Fish and Wildlife

Melisa Cummins
DPNR - Environmental Protection

Pedro Nieves
DPNR – Coastal Zone Management

Renata Platenberg
DPNR – Fish and Wildlife

Aretha Marshall
DPNR – Libraries and Archives

Shervin Williams
DPNR – Information Technology

Shawn Margles
TNC

Syed Syedali
DPNR - Environmental Protection

Tina Bernier
DPNR - Environmental Protection

DPNR Spatial Data Policy Quick Reference Guide

Basic GPS Settings, Datums, & Projections

Data should be collected in the WGS84 or NAD 83 datum and projected into USVI PR FIPS 5200 for better interoperability in a mapping program. Data must be in NAD83 before it is submitted to DPNR or posted to the DPNR server, until a Caribbean specific NAD datum is defined (pending 2010). All CAD systems with spatially referenced information must be created using NAD83.

Naming Conventions

Use a standard 1-character island abbreviation naming convention for the three main islands *(refer to Appendix C for additional naming conventions for territory islands, cays, and rocks)*:

- St. Thomas - T
- St. John - J
- St. Croix - X

No special characters or spaces may be used for named files. Length must be limited to eight (8) or fewer characters. Use these abbreviations when naming data. For example: "1-character island abbreviation" + "description/type"

X_drg
X_dem
J_con100
J_soil
T_roads
T_coast

Metadata

All data being submitted to DPNR and/or being posted to the DPNR server must have FGDC compliant metadata consistent with the dataset name, comparable attribute information, and data lineage. Completed metadata should at least contain these metadata guidelines to be consistent with standards found at the following link: http://www.fgdc.gov/standards/:

[1]Mandatory Elements:	Conditional Elements:
Dataset title	Dataset responsible party
Dataset reference date	Geographic location by coordinates
Dataset language	Dataset character set
Dataset topic category	Spatial resolution
Abstract	Distribution format
Metadata point of contact	Spatial representation type
Restrictions or limits of use	Reference system
Accuracy statement	Lineage statement
Metadata date stamp	On-line Resource
	Metadata file identifier
	Metadata standard name
	Metadata standard version
	Metadata language
	Metadata character set

[1] Federal Geographic Data Committee, http://www.fgdc.gov

GIS Policy Group

The Department of Planning and Natural Resources will establish a GIS Policy Group that will be responsible for making spatial data policy decisions and recommendations and for reviewing new spatial data. Members of this group shall be appointed by the commissioner via recommendation of the GIS Work Group.

GIS Work Group

The Department of Planning and Natural Resources will establish a GIS Work Group to serve as a resource for Departmental GIS users. The main purpose of this work group is to discuss ongoing GIS projects being conducted within the territory. This group will be a point of information for others that are interested in current and planed GIS initiatives within the territory. This group may also discuss Departmental GIS needs and make recommendations to the GIS Policy group. The GIS Work Group is open to any interested GIS or potential GIS user within the Department.

Data Exchange

All departments and programs must share GIS data and make framework data[2] available in ESRI format with FGDC based metadata. A network service established on St. Thomas and St. Croix will facilitate access to the most current GIS data available within the Department. An identical file structure will be maintained on each server[*]. Framework data will be updated between servers every six months. Shapefiles, KML, KMZ, and/or Geodatabases must be included in a .zip file along with metadata for posting to the server data directory and archive. The server data directory and archive will provide a clearinghouse for local agencies, visiting researchers, and other interested parties to access framework data sets. Also, in the future a network between islands will be established to help facilitate the dissemination of GIS data in the territory.

It is the responsibility of the DPNR GIS Policy Group to review and approve all data before it is posted to the data directory or archive. The GIS Policy group may consult with and seek recommendations from the GIS Work Group. As programs within DPNR update layers, approval must be granted by the Policy Group before updates may be uploaded to the jointly accessible GIS server. Data updates and permissions may be discussed and sought at the regularly scheduled Work Group meetings.

Datum and Projections

All data will be submitted for use in a North American Datum of 1983 (NAD83). Presently, GIS data in USVI are typically collected in either the World Geodetic Survey datum of 1984 (WGS84) or NAD83. Typically, most Geographic Positioning System (GPS) units come from the manufacturer set in WGS84 and have a Geographic Projection. Data can be converted post processed through the use of various tools like, NADCON and CORPSCON. Although it would be sufficient for GPS users to continue collecting data with a Geographic Projection, users will be able to collected data with a greater degree of accuracy if they use NAD83 and then projected into State Plane Puerto Rico Virgin Islands FIPS 5200 in a GIS.

Additionally, in order to take full advantage of current and future geographic data creation efforts and as a means to comply with Federal standards, agencies operating within the territory must

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[2] For a description of framework data see the section on *Framework Data* on page 4 of this document.

[*] See the section on *Directory Structure* and *Appendix B* for details on the identical file structure.

convert and transform their existing data to NAD83. Additionally, it is stressed that all new GIS and CAD information be created using NAD83.

Please see Appendix A for an explanation of commonly used datums and projections and for the USVI.

DPNR Framework Data

Geographic data users from many disciplines have a recurring need for a few basic layers of GIS data, and as such, the data framework is a collaborative effort to create a common and readily available source of information. It is the responsibility of the DPNR GIS Policy Group to review and approve all data before it is posted to the Framework Data folder. Framework data will provide the most common data themes and represent a foundation on which organizations can build by adding their own detail and compiling other datasets (for more information see: http://www.fgdc.gov/framework). Also, by structuring a GIS on the framework data, organizations users will be able to produce applications more easily and at less cost.

The following layers are included in the territorial dataset:

1. Geodetic control
2. Orthoimagery
3. Elevation
4. Transportation, (roads, trails, airports & ports, etc)
5. Hydrography, (lakes and ponds, streams and rivers, oceans, and shorelines)
6. Administrative Boundaries (regulatory boundaries, park boundaries, political boundaries, managed areas, etc.)
7. Cadastral information
8. Habitat
9. Facilities
10. Monitoring

Directory Structure

Until a single server can be established to service all areas within the territory, two servers will be set up. One will be in St. Thomas and on will be in St. Croix. Users on St. Thomas and St. Croix will be able to access GIS data from designated networked locations. However, these two servers will not be networked to each other. Both servers will have an identical file structure (Figure 1). The servers will be updated every six months to ensure consistent data usage throughout the territory. A view of the GIS Directory structure that will be installed on both servers; details on each folder and an expanded view of the "data" folder can be found in Appendix B.

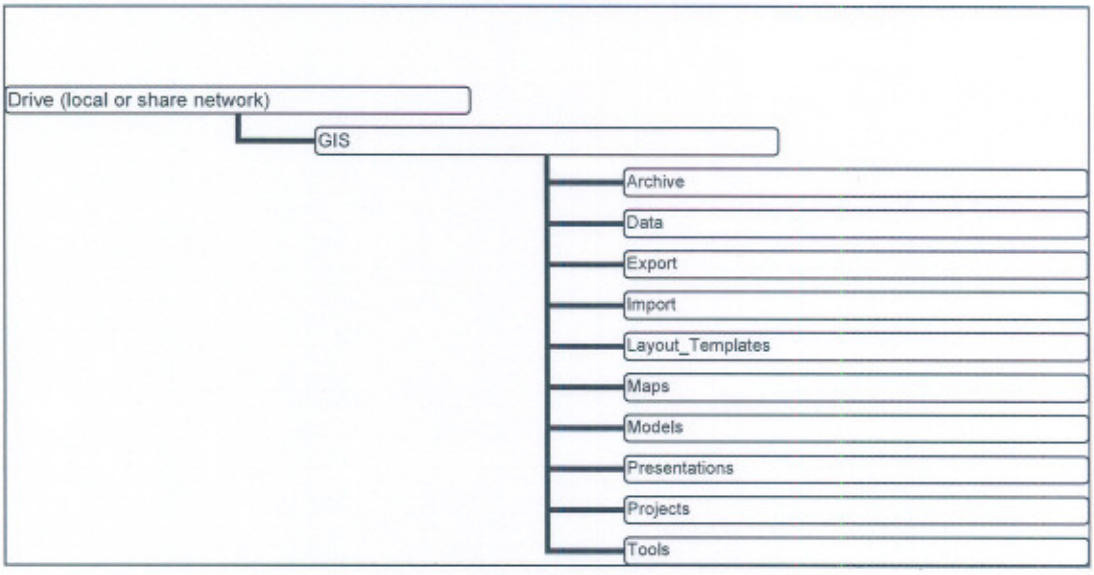

Figure 1: View of the GIS directory structure.

Naming Conventions

Use a standard 1-character island abbreviation naming convention for the three main islands *(refer to Appendix C for additional naming conventions for territory islands, cays, and rocks)*:

- St. Thomas - T
- St. John - J
- St. Croix - X

No special characters or spaces may be used for named files. Length must be limited to eight (8) or fewer characters. Use these abbreviations when naming data. For example: "1-character island abbreviation" + "description/type"

X_drg
X_dem
J_con100
J_soil
T_roads
T_coast

Available Imagery

The standard for publicly submitted scanned photos or maps is TIFF format when high quality resolution is necessary. For general purposes a JPEG/ECW format is acceptable.

Metadata

All data being submitted to DPNR and/or being posted to the DPNR server must have FGDC compliant metadata consistent with the dataset name, comparable attribute information, and data lineage. Completed metadata should at least contain these metadata guidelines to be consistent with standards found at the following link: http://www.fgdc.gov/standards/:

[3]Mandatory Elements:	Conditional Elements:
Dataset title	Dataset responsible party
Dataset reference date	Geographic location by coordinates
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Metadata point of contact	Spatial representation type
Restrictions or limits of use	Reference system
Accuracy statement	Lineage statement
Metadata date stamp	On-line Resource
	Metadata file identifier
	Metadata standard name
	Metadata standard version
	Metadata language
	Metadata character set

Table 1: Metadata mandatory and conditional elements

Currently, there are two tools commonly used for writing metadata: ESRI's ArcCatalog and the NOAA Coastal Services Center Metadata Collector. ArcCatalog is the preferred tool for ArcGIS users while the Coastal Services Center Metadata Collector runs as an extension within ArcView 3.x. **Metadata must be created before data is distributed to other users or published to the online archive.**

[3] Federal Geographic Data Committee, http://www.fgdc.gov

Appendix A
Definitions of Commonly Used Projections and Datums

Geographic Decimal Degrees (GeoDD)
The standard geographic coordinate system of the world involves latitudes north or south of the Equator and longitudes east or west of the Prime Reference Meridian of Greenwich. Values for this spherical coordinate system may be expressed in one of three formats as shown below:

Degrees – Minutes – Seconds: 144° 15' 30"
Degrees Decimal Minutes: 143° 44.520264
Decimal Degress: 143.742

Geographic Decimal Degrees is a format of latitude and longitude that is very easy to work within ESRI GIS Software.

Stateplane Coordinate System (SPC)
A projected coordinate system used in the United States that divides each state into one or more zones to minimize distortion caused by the map projection. This projection is commonly used by municipal governments in the United States where area calculations are most crucial (e.g. for tax maps.) Stateplane zones are defined by using either one of two projection types depending on the orientation of the state or territory as follows:

Lambert Conformal Conic - east/west oriented states
Transverse Mercator - north/south oriented states

Universal Transverse Mercator Zone 20 North (UTM20N)
The Universal Transverse Mercator (UTM) system is a global set of coordinate systems commonly used in the United States on topographic maps and for large-scale digital cartographic data. The UTM system divides the world into sixty uniform zones with a width of 6 degrees of longitude. The zones are numbered from 1 to 60 eastward, beginning at 180 degrees. The data creation standard for the USVI, as enacted by the Spatial Data Infrastructure Policy, employs Zone 20 North in association with the North American Datum 1983 standard. This projection is a specialized application of the Transverse Mercator projection. The limits of each zone are 84° N, 80° S. Each zone has its own central meridian. It's aligned so that vertical grid lines are parallel to the center of the zone, called the central meridian. UTM grid coordinates are expressed as a distance in meters to the east, referred to as the "easting", and a distance in meters to the north, referred to as the "northing". UTM easting coordinates are referenced to the center line of the zone known as the central meridian. The central meridian is assigned an easting value of 500,000 meters East. UTM northing coordinates are measured relative to the equator. Units associated with this projection are stored in meters.

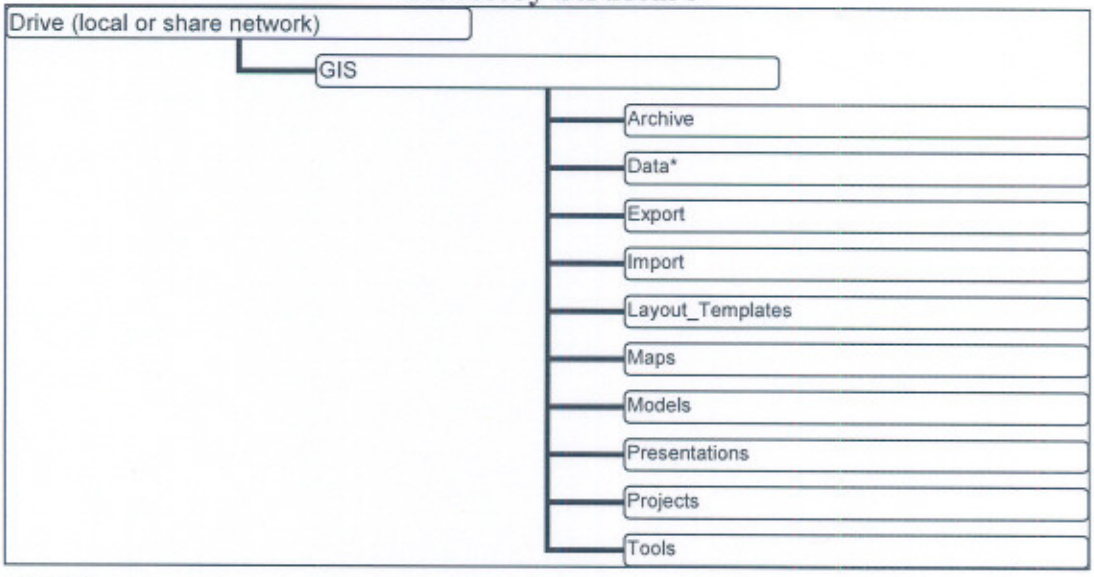
North American Datum 1983 (NAD83)
The North American Datum of 1983 is based upon both Earth and satellite observations, using the GRS80 spheroid. The origin for this datum is the Earth's center of mass. This affects the surface location of all latitude-longitude values enough to cause locations of previous control points in North America to shift, sometimes as much as 500 feet. A ten-

year multinational effort tied together a network of control points for the United States, Canada, Mexico, Greenland, Central America, and the Caribbean.

World Geodetic Survey 1984

Satellite data has provided geodesists with new measurements to define the best Earth-fitting ellipsoid, which relates coordinates to the Earth's center of mass. An Earth-centered, or geocentric, datum does not have an initial point of origin like a local datum. The Earth's center of mass is, in a sense, the origin. The most widely used datum is the World Geodetic System of 1984 (WGS84). It serves as the framework for supporting locational measurement worldwide. GPS measurements are based upon the WGS84 datum.

Appendix B
Directory Structure



GIS Directory structure.

Brief descriptions of each of the main folders:

Archive: Repository for closed projects. For reference purposes it is a good idea to keep all associated data and shape files along with a copy of map projects in the archive.

Data: Repository for framework data. In order for information to be posted here it must first be reviewed and approved by the DPNR GIS Work Group. This should be considered a tool for inter-department and agency data sharing and standardization.

Docs: Contains any GIS related documents. For example, documents about data structure, handbooks, address schemes, hardware / network configuration, software license, MOU's, etc. (*This folder will appear within projects as well to track project correspondence, processing protocols and classification schemes benthic habitat, standardized industrial codes, land use classifications, etc.)*

Export: Data stored to be provided to 3rd party. Files to be written to CD can be *temporarily* stored here to address data requests.

Import: Data received from a 3rd party can be *temporarily* stored in here before incorporation into the GIS data structure

Layout_Templates: Repository for .mxd file layout templates. This is useful for saving commonly used color schemes, legends, and map layouts and will minimize time and effort required to recreate map appearances.

Maps: Repository for final and standard map products (usually in .pdf or .jpg) from ones own agency or a 3rd party.

Models: Repository for models or scripts that have application to more than one project.

Presentations: Repository for any GIS based PowerPoint presentations.

Projects: The location of intra-departmental or agency GIS projects. All project folders should have descriptive titles that are easy to identify.

Tools: For storage of useful ERSI tools and extensions.

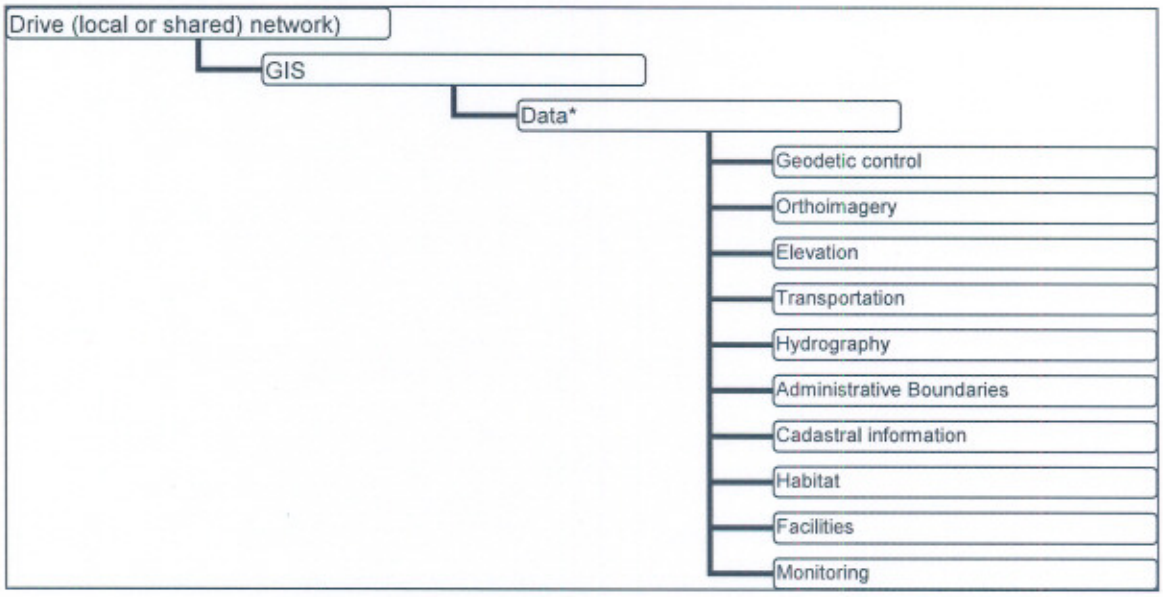


Figure 2: Expanded view of data folder.

*Data folder structure may be amended upon approval by the DPNR GIS Work Group.

Geodetic control: Geodetic control provides a common reference system for establishing the coordinate positions of all geographic data. It provides the means for tying all geographic features to common, nationally used horizontal and vertical coordinate systems. The main features of geodetic control information are geodetic control stations. These monumented points (or in some cases active Global Positioning System control stations) have precisely measured horizontal or vertical locations and are used as a basis for determining the positions of other points. The geodetic control component of the framework consists of geodetic control stations and related information -- the name, feature identification code, latitude and longitude, orthometric height, and ellipsoid height, and metadata for each station. The metadata for each geodetic control point contains descriptive data, positional accuracy, condition, and other pertinent characteristics for that point. Geodetic control information plays a crucial role in developing all framework data and users' applications data, because it provides the spatial reference source to register all other spatial data. In addition, geodetic control information may be used to plan surveys, assess data quality, plan data collection and conversion, and fit new areas of data into existing coverages.

Orthoimagery: Orthoimagery provides a positionally correct image of the earth. An orthoimage is a georeferenced image prepared from an aerial photograph or other remotely sensed data from which displacements of images caused by sensor orientation and terrain relief have been removed. An orthoimage has the same metric properties as a

map and has a uniform scale. Digital orthoimages are composed of an array of georeferenced pixels that encode ground reflectance as a discrete digital value.

Elevation: Elevation data provide information about terrain. Elevation refers to a spatially referenced vertical position above or below a datum surface. The framework includes the elevations of land surfaces and the depths below water surfaces (bathymetry).

Transportation: The framework's transportation data include the following major common features of transportation networks and facilities: roads, trails, airports & ports.

Hydrography: Framework hydrography data include surface water features such as lakes and ponds, streams and rivers, guts, oceans, and shorelines. Each of these features has the attributes of a name and feature identification code.

Administrative Boundaries: Regulatory boundaries, park boundaries, political boundaries, managed areas.

Cadastral information: Cadastral information refers to property interests. Cadastral data represent the geographic extent of the past, current, and future rights and interests in real property. The spatial information necessary to describe the geographic extent and the rights and interests includes surveys, legal description reference systems, and parcel-by-parcel surveys and descriptions.

Habitat: Including soils, benthic habitant, conch census sites, seagrass habitat, spawning aggregation sites, wetlands, beaches, and others.

Facilities: Regulated facilities such as power plants, discharge locations, and any facilities that require an environmental permit.

Monitoring: Including water quality, DEP assessment units, and DEP monitoring sites.

Appendix C
Table 2: Naming Conventions for USVI Rocks and Cays

Rock, Cay, or Island Name	Abbreviation
Big Flat Cay	bifl_c
Black Rock	blac_r
Blunder Rock	blun_r
Booby rock	boob_r
Bovoni Cay	bovo_c
Buck Island-STX	buck_i_X
Buck Island-STT	buck_i_T
Calf Rock	calf_r
Capella Island	cape_i
Caravel Rock	cara_r
Cas Cay	cas_c
Cinnamon Cay	cinn_c
Cockroach Cay	cock_c
Cocoloba Cay	coco_c
Congo Cay	cong_c
Copulus Rock	copu_r
Cow Rock	cow_r
Cricket Rock (and cingo)	cric_r
Current Rock	curr_r
Dog Island	dog_i
Dog Rock	dog_r
Durloe Cays	durl_c
Dutchcap Cay	dutc_c
Fish Cay	fish_c
Flanagan Island	flan_i
Flat Cay	flat_c
Fraven Cay	frac_c
Frenchcap Cay	fren_c
Geese Cay	gees_c
Grass Cay	gras_c
Great St. James	grsj_i
Green Cay-STT	gree_c_T
Green Cay-STX	gree_c_X
Hans Lollick Island	halo_i
Hans Lollick Rock	halo_r
Hassel Island	hans_i
Henley Cay	henl_c
Inner Brass	inbr_i
Kalkun Cay (Turkey Cay)	kalk_c
Lagoon Island	lago_i
Leduck Island	ledu_i
Little Hans Lollick Island	lhalo_i
Little St. James Island	lstj_i
Lovango Cay	lova_c
Manglars Cay	mang_c

Mingo Cay	ming_c
Murder Rock	murd_r
Outer Brass Island	oubr_i
Patricia Cay	patr_c
Pelican Cay	peli_c
Perkins Cay	perk_c
Porpoise Rocks	porp_r
Protestant Cay	prot_c
Ramgoat Cay	ramg_c
Rata Cay	rata_c
Rotto Cay	rott_c
Rupert Rock	rupe_r
Ruth Cay	ruth_c
Saba Island	saba_i
Sail Rock	sail_r
Salt Cay	salt_c
Saltwater-Money Rock	samo_r
Savana Island	sava_i
Shark Island	shar_i
Skipper Jacob Rock	skip_r
Sontie Island	sont_i
Steep Rock	stee_r
Steven Cay	stev_c
Sula Cay	sula_c
Thatch Cay	that_c
Trunk Cay	trun_c
Turtleback Rock	tuba_r
Turtledove Cay	tudo_c
Two Brothers	twbr_r
Water Island	watr_i
Waterlemon Cay	wtrle_i
Wave Rock	wave_r
Welk Rock	welk_r
West Cay	west_c
Whistling Cay	whis_c

Appendix D
GIS Acronyms and Definitions

(Note: for more complete information please consult the cited source at the end of each definition entry)

Computer Aided Design (CAD) - Software packages designed for high quality graphical output regarding the design of products. Automated functions allow for easy and fast output, which can be utilized by a novice user as well as the specialist. Especially used within engineering, surveying, and architecture. AGI GIS Dictionary: http://www.geo.ed.ac.uk/agidict/alpha.html

Continuously Operating Reference Station (CORS) – The National Geodetic Survey (NGS) coordinates a network of continuously operating reference stations that provide Global Positioning System (GPS) carrier phase and code range measurements in support of 3-dimensional positioning activities throughout the United States and its territories. Surveyors, GIS/LIS professionals, engineers, scientists, and others can apply CORS data to correct position points at which GPS data have been collected. The CORS system enables positioning accuracies that approach a few centimeters relative to the National Spatial Reference System, both horizontally and vertically. CORS General Information Page http://www.ngs.noaa.gov/CORS/

Datum and Projections - The datum and projection for geographically referenced information defines the "wire" framework that all accurate GIS data are built upon. A datum defines the size and shape of the earth and the origin and orientation of the coordinate systems used to map the earth. Hundreds of different datums have been used to frame position descriptions since the first estimates of the earth's size were made. Datum have evolved from those describing a spherical earth to ellipsoidal models derived from years of satellite measurements. Through a long history, the "figure of the earth" was refined from flat-earth models to spherical models of sufficient accuracy to allow global exploration, navigation, and mapping. In essence, the datum tells the user what spheroid, or figure, of the earth's surface is being used. Using a datum that is the most representative model of the earth's surface in the area in which a user is collecting data will improve the accuracy of the data that is collected.

A projection defines where on the earth a point is located if the spheroid, or figure of the earth, were to be flattened out. More technically, projections systematically project locations from the surface of a spheroid to representative positions on a flat surface using mathematical algorithms. When working with GIS data, the user can chose what projection is best suited for the site in which they are working. For the USVI the most accurate projection of the earth is Universal Transverse Mercator 20 North (UTM20 North).

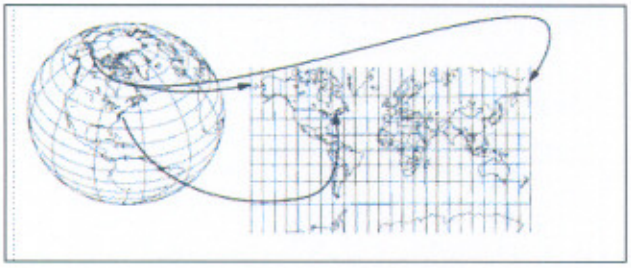


Figure 3: Indication of how point locations are translated from a datum to a projection. Image from www.franson.com/.

Digital Elevation Model (DEM) - Digital Elevation Models (DEMs) are a type of raster GIS layer. Raster GIS represents the world as a regular arrangement of locations. In a DEM, each cell has a value corresponding to its elevation. The fact that locations are arranged regularly permits the raster GIS to infer many interesting associations among locations: Which cells are upstream from other cells? Which locations are visible from a given point? Where are the steep slopes? One of the most powerful applications of DEMs is adding synthetic hillshading to maps so that the map reader may see the relationship between terrain and other things you may be mapping. Harvard Graduate School of Design http://www.gsd.harvard.edu/gis/manual/dem/index.htm

Digital Line Graph (DLG) - The digital format standards published by US Geological Survey for exchanging cartographic data files and in which the USGS delivers topographical maps in vector format.
AGI GIS Dictionary: http://www.geo.ed.ac.uk/agidict/alpha.html

Environmental Systems Research Institute (ESRI) – Creator of the most widely used GIS software packages ArcView and ArcInfo, "more than 1,000,000 people around the world use ESRI's GIS."
http://www.esri.com/

Federal Geographic Data Committee (FGDC) - coordinates the development of the National Spatial Data Infrastructure (NSDI). The NSDI encompasses policies, standards, and procedures for organizations to cooperatively produce and share geographic data. Federal Geographic Data Committee http://www.fgdc.gov/index.html/

File Transfer Protocol (ftp) - is a standard Internet protocol, which is the simplest way to exchange files between computers on the Internet.
http://whatis.techtarget.com/definition

Framework data - a collaborative community based effort in which commonly needed data themes are developed, maintained, and integrated by public and private organizations within a geographic area.
Federal Geographic Data Committee http://www.fgdc.gov/framework/frameworkfaq#q1

Geographic Information System (GIS) - A computer system for capturing, storing, checking, integrating, manipulating, analyzing, and displaying data related to positions on the Earth's surface. Typically, a Geographical Information System (or Spatial Information System) is used for handling maps of one kind or another. These might be represented as several different layers where each layer holds data about a particular kind of feature. Each feature is linked to a position on the graphical image of a map.
AGI GIS Dictionary: http://www.geo.ed.ac.uk/agidict/alpha.html

Global Positioning System (GPS) - A satellite based navigational system allowing the determination of any point on the earth's surface with a high degree of accuracy given a suitable GPS receiver.
AGI GIS Dictionary: http://www.geo.ed.ac.uk/agidict/alpha.html

Map Projection - A method of representing the earth's three-dimensional surface as a flat two-dimensional surface. This normally involves a mathematical model that transforms the locations of features on the earth's surface to locations on a two-dimensional surface. Because the earth is three-dimensional, some method must be used to depict the map in two dimensions. Therefore such representations distort some parameter of the earth's surface, be it distance, area, shape, or direction.

Metadata - Metadata is information or data about spatial data that typically describes the content, quality, condition, and other characteristics of data. With increasing amounts of data being created and stored there is a real need to properly document GIS data for future use. Metadata includes, but is not limited to, information such as the data source, methodology, projection, datum, date created, and key words for searching. The SDI COOKBOOK is an excellent resource for developing metadata. The International Organization of Standards (ISO) has set the following core metadata elements (Federal Geographic Data Committee, http://www.fgdc.gov).

Additionally, metadata is a means for protecting an organization's investment in data development from staff turnover, which often results in a loss of institutional memory. It can also help to avoid redundant data creation efforts by helping to ensure that the end users are aware of existing datasets.

The Federal Geographic Data Committee (FGDC) is the agency responsible for creating the federal metadata standard. Many federally funded grant projects require FGDC metadata as part of the delivered products. Therefore, to insure continued funding for most federal GIS projects it is necessary to write metadata.
Federal Geographic Data Committee http://www.fgdc.gov/framework/metadata

Scale - The ratio of the distance measured on a map to that measured on the ground between the same two points.
AGI GIS Dictionary: http://www.geo.ed.ac.uk/agidict/alpha.html

Spatial data - Any information about the location and shape of, and relationships among, geographic features. This includes remotely sensed data as well as map data. AGI GIS Dictionary: http://www.geo.ed.ac.uk/agidict/alpha.html

National Spatial Data Infrastructure (NSDI) - The technologies, policies, and people necessary to promote sharing of geospatial data throughout all levels of government, the private and non-profit sectors, and the academic.
Federal Geographic Data Committee http://www.fgdc.gov/framework/metadata

United States Geological Survey (USGS) – The USGS is the National mapping agency of the United States. Produces paper maps, digital maps and DEMs for the entire nation at a variety of scales, including 1:24,000, 1:100,000, 1:250,000 and 1:1 million. AGI GIS Dictionary: http://www.geo.ed.ac.uk/agidict/alpha.html

Universal Transverse Mercator (UTM) - A grid system based upon the Transverse Mercator projection. The UTM grid extends North-South from 80oN to 80oS latitude and, starting at the 180o Meridian, is divided eastwards into 60, 6o zones with a half-degree overlap with zone one beginning at 180o longitude. The UTM grid is commonly used for topographic maps and georeferencing satellite images. AGI GIS Dictionary: http://www.geo.ed.ac.uk/agidict/alpha.html

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