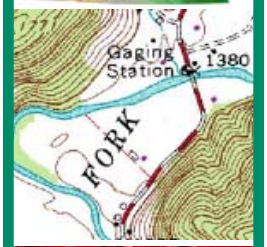
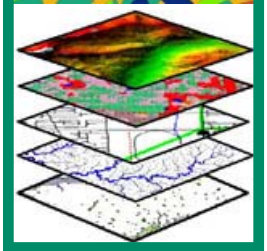
The Virginia Geospatial Newsletter

Showcasing GIS, Remote Sensing and GPS Supported Products and Services in the Commonwealth

Volume 6, Number 2 **Spring, 2008**

The Virginia Geospatial Extension Program is a partnership between the Virginia Space Grant Consortium and Virginia Cooperative Extension





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As We Walk Along the Path: Appomattox County is Finding GIS to be Beneficial

By:
Johnnie Roark
Appomattox County Planner

Appomattox, Virginia is known mainly as the location for the end of the "war between the states", but recently some new and exciting history has been made in the realm of GIS. Five years ago, GIS was an unheard of acronym in this part of the state, but as with a number of rural localities, the initial phases of GIS were born out of the public safety element, specifically, the E911 road centerline and addressing project.

In the late 1990's and early 2000's, Appomattox County convened a 25 member citizen committee that worked diligently to name all of the roads in the county and bring the county into state compliance on implementation of E911. The county hired an E911 Coordinator and remodeled one of the historic courthouse complex buildings into the E911 Call Center. After many years of trying and many hours of preparation, in February of 2007 the Call Center went "live" and has run smoothly ever since. A lot of data was collected and a lot of equipment and software was purchased, but a comprehensive use of GIS was never envisioned.

> *...many of the identified GIS applications crossed over the imaginary department lines and a core of four to five applications have become the focal point as we move forward.*

However, in the spring of 2007 staff with the County Administrator's office began to

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The Virginia Geospatial Newsletter is a quarterly publication developed through the Virginia Geospatial Extension Program, a partnership between the Virginia Space Grant Consortium (VSGC) and Virginia Cooperative Extension (VCE). The newsletter is published in conjunction with The Virginia Geographic Information Network (VGIN).

The purpose of the Virginia Geospatial Newsletter is to highlight innovative geospatial products and services throughout the commonwealth and to widely disseminate geospatial knowledge and awareness throughout Virginia.

If you have suggestions or comments, or if you would like to contribute to the newsletter, please contact John McGee at the Virginia Geospatial Extension Program (jmcg@vt.edu or [540] 231-2428).

What's Inside

VGIN Update

By:
Dan Widner
VGIN Coordinator

Greetings folks! There are a lot of exciting activities at VGIN these days and I'd like to highlight a few of these for you.

Updated Website!

The VGIN website has been redesigned! Go to http://www.isp.virginia.gov and follow the link on the left to "Geospatial Services" on the left side. You will notice that the site also provides access to Public Safety and Radio Engineering services (the Integrated Services Program) from VITA. We plan to take full advantage of the new site to continuously share information with you so I hope you will bookmark the page.

The Metadata Portal:

By now you should be familiar with the Metadata Portal at http://GISData.virginia.gov Now that the tool is in place we need state and local governments to start populating it with their geospatial metadata. Starting in calendar year 2008 we will be working with state agencies to help them fulfill the Code of Virginia mandate to report their geospatial metadata on a quarterly basis. By March 31, 2008 all state agencies that produce geospatial data should have reported on their metadata through the Metadata Portal. VGIN will provide regularly scheduled metadata training for all takers on a quarterly basis. Many training opportunities have already occurred, and more will be scheduled as needed.

List serves

VGIN now maintains four email listservs for sharing GIS information. There are listservs for Virginia state agency employees, Virginia local government employees, higher education and the general public. Members not only receive pertinent information from VGIN, but also can use these moderated listservs to broadcast GIS related information they wish to share. To join one of these listservs, please contact Sam Hall at samuel.hall@vita.virginia.gov

Ortho Update:

All of the 2007 imagery has now been delivered, three weeks ahead of schedule. Please contact Project Manager Stu Blankenship stuart.blankenship@vita.virginia.gov if you have any questions about your deliveries or if you would like to procure this imagery. VGIN provides imagery to state and local government, as well as other entities, through its products and services.

Planning for the next statewide flyover beginning in 2009 has begun with the formation of an Orthophotography Community Of INterest (CoIN). VGIN has spent the last year obtaining state and local government input to assess user needs and develop requirements, with a goal of releasing an RFP around May 2008. Look for more information on the VGIN website.

VBMP Road Centerlines (RCL):

RCL maintenance has transitioned from Timmons Group to VGIN as of December 2007. Local, regional and statewide products are available. Look for continuous improvements and refinements in the near future with this important base map product.

The VA LiDAR Initiative

VGIN has initiated a Cost Benefit Analysis to evaluate the feasibility of statewide acquisition of LiDAR (Light Detection And Ranging) data. More information is available on the VGIN website under "Events and Activities".

Emergency Management Application

The Emergency Management Mapping Application (EMMA) has been fully deployed in the Virginia Emergency Operations Center for the Virginia Department of Emergency Management, as well as the Emergency Operations Centers in Charlottesville/Albemarle County and the City of Richmond.

Project Homeland

Virginia is participating as a pilot state in Project Homeland. Project Homeland is a program funded by the National Geospatial-intelligence Agency and executed by ESRI. The goal is to enable efficient sharing of homeland security and emergency management GIS data between localities, the state, and the federal government. As of this writing, a Statement of Work is being drafted.

NAIP Imagery Update

Virginia state agencies have partnered with the USDA Farm Services Agency to obtain 100% coverage for the 2008 NAIP orthophotography. What a great

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Federal Government

U.S. Army Corps of Engineers uses GIS to support the Virginia Hurricane Evacuation Restudy

By:
Michelle Hamor
Civil Engineer / GIS Analyst
U.S. Army Corps of Engineers – Norfolk District

The U.S. Army Corps of Engineers (USACE), Norfolk District is currently partnering with the Federal Emergency Management Agency, the Virginia Department of Emergency Management, and local government agencies to complete the Virginia Hurricane Evacuation Restudy. The restudy was initiated because of changes within the study area, advances in technology, improved computational methods, and lessons learned from past hurricane events.

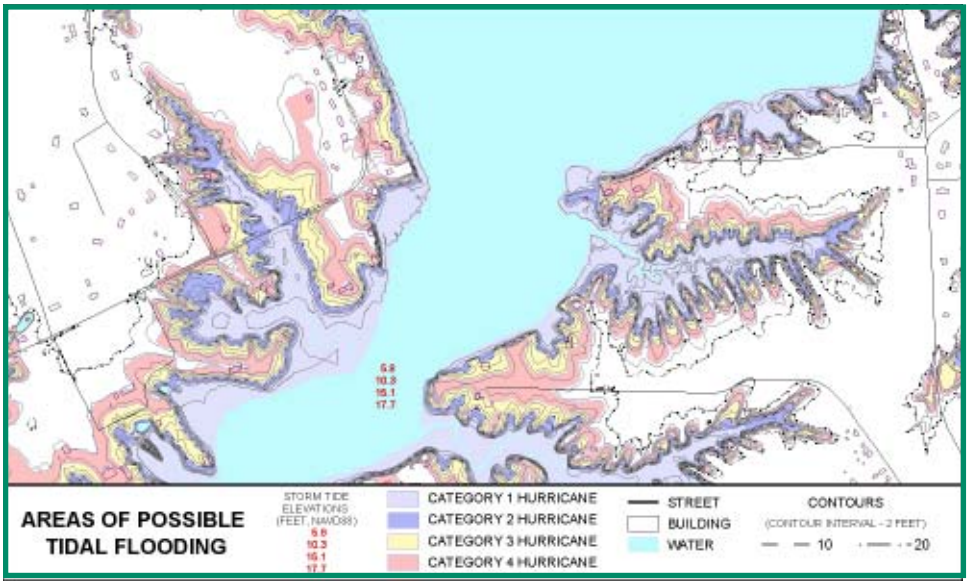

Figure 1: An example of a Hurricane Storm Tide Flood Map created during the Virginia Hurricane Evacuation Restudy.

This project is an update of the 1992 study and will assist federal, state and local governments with their ongoing hurricane evacuation planning efforts. The study area includes a total of 18 Virginia cities and counties. One important product of the restudy is the development of storm tide maps that show areas subject to potential tidal flooding. This information serves as the foundation for completing Shelter Analysis and Transportation Analysis parts of the restudy.

The storm tide maps produced from the restudy have significantly improved from those completed in the 1992 study. Improvements include new and improved storm surge modeling by the National Weather Service/National Hurricane Center, digital elevation data providing better map accuracy, map scale offering more detail, planimetric and topographic base map information, and maps produced in a Geographic Information Systems (GIS) format.

The cities of Chesapeake, Hampton, Newport News, Norfolk, Portsmouth, Suffolk, and Virginia Beach, along with York County provided digital elevation data, with a contour interval of 2 feet or better, which supported the development of topographic TINs or Triangulated Irregular Networks. ESRI ArcMap's 3D Analyst extension was used to create the TINs. TINs are better at recreating a detailed surface than a grid because it allows the use of multiple data sources. The topographic TINs were compared with aerial photography for anomalies, identifying any odd high elevation that may affect the interpolation of the TIN. TINs were then created for each category of surge. The topographic and surge TINs were converted to grids and raster calculations were performed. The resulting inundations were converted to shapefiles, cleaned and reviewed.

There were several challenges to modeling hurricane surge inundation.

- **Interpolation between flooding sources –** It is very important to control the interpolation between flooding sources as their surge elevations can vary greatly. A watershed delineation analysis can be performed to determine where to clip each watershed. The smaller area (watershed vs. entire locality) also allows for a finer grid resolution. A finer grid resolution is important to

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Appomattox County

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seriously consider the full implementation of GIS throughout all local government offices and how this could benefit everyone from county staff to the average citizen.

During the spring of 2007, the success of the E911 endeavor spawned a great deal of interest in GIS. County staff and stakeholders were interested in learning how other county offices could benefit from a broader implementation of geospatial tools.

The Next Step-*Finding A Path…..*

Having no one on staff with any significant knowledge or experience with GIS, county staffers started looking for assistance from a number of sources including other local governments, state agencies, and the private sector.

With the help of the Local Government Council, county staff was put in contact with John McGee, Virginia's Geospatial Extension Specialist, based at Virginia Tech. The Virginia Geospatial Extension Program recommended creating a data and application matrix to support a "GIS implementtion and strategic plan" for the county. When complete, the plan would be used to support the county's efforts to identify geospatial application and data priorities and help chart a path for success in implementing GIS. Appomattox County did not know that this path, while well traveled, had many pitfalls and stumbling blocks, although we recognized that the end result would be tremendous!

The Geospatial Extension Program began developing the strategic planning process by organizing a hands-on workshop with approximately 20 staffers from all departments of Appomattox County government. Representatives from the Town of Appomattox, the school system, parks and recreation, solid waste, building, planning, economic development, voter registration, Clerk of the Court and Commissioner of Revenue all enjoyed a hands-on "GIS 101" workshop in Appomattox County. Dr. McGee and his team from Virginia Tech spent most of the morning session teaching basic concepts and terminology. As mid-day approached the group moved outdoors to some hands-on learning by collecting data with hand-held GPS units, and we integrated this data within the ArcGIS environment, and we learned some simple map making techniques.

A hands-on workshop provided Appomattox County employees with a GIS workshop, using local data. The workshop provided real world demonstrations showing how GIS could support local government applications.

Real world examples were provided through the workshop, using spatial data that the Geospatial Extension Program had either developed or compiled for Appomattox County. These examples were used to demonstrate the potential day to day business applications of this software application. Overall, the workshop was a great success and further energized the county staff as we traveled upon a new "unbeaten" path for this rural locality.

The Implementation Plan Via a GIS Application Matrix -*Seeing the Forest, Despite the Trees…*.

In early fall 2007 Dr. McGee spent a couple of jam-packed days visiting with staffers from each county department to gauge the interest in GIS and to identify and catalogue potential GIS applications that could support the business needs of each of these departments. At the end of the two days, a much clearer picture had emerged for the implementation team.

As it turned out, data associated with many of the GIS applications crossed over all of the imaginary department lines. A core of four to five applications became the focal point as we moved forward. It also became apparent that a lot of the necessary data already existed (aerial photography, roads, streams, soils, etc.). It then became obvious that several GIS applicaitons could be implemented almost immediately.

In December of 2007, the county's implementation plan was complete and presented to the Board of Supervisors. The Board was very receptive, supportive and excited about the possibilities. One of the major advantages to the county's geospatial

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Special Feature

USDA's Farm Service Agency Partners With Commonwealth of Virginia for Acquisition of 4-Band One Meter Leaf-On Imagery in 2008

By:
Dan Mertz, GIS Coordinator, Farm Service Agency – Virginia
and
Dan Widner, Coordinator, Virginia Geographic Information Network

The United States Department of Agriculture's (USDA) Farm Service Agency (FSA) in Virginia plans to acquire 1-meter leaf-on natural color imagery in the spring and summer of 2008 as part of its National Agricultural Imagery Program (NAIP) 5-year collection cycle. Typically, the USDA captures approximately 85% of the land area in Virginia during the agricultural growing season in support of the Farm Service Agency's mission of maintaining the Common Land Unit boundaries (CLU's) and to assist with crop compliance and other farm programs. The value of this public domain NAIP imagery goes beyond the USDA-FSA, as these data products are widely used by many other parties at all levels of government to support a wide range of geospatial products and applications across the Commonwealth.

In this update cycle, the Commonwealth of Virginia is partnering with the USDA-FSA to expand the coverage and accuracy of the 2008 product. Through the partnership, Virginia coverage is extended to 100% of the land mass. The horizontal control will be enhanced through the use of the Virginia Base Mapping Program control points. In addition, the final product will include color infrared as a component of a 4 band (Red, Green, Blue, Near Infrared) imagery deliverable. The Virginia Geographic Network (VGIN) is coordinating the state partnership with USDA-FSA and the Virginia Department of Forestry, the Virginia Department of Transportation and VGIN have contributed funding to upgrade the product.

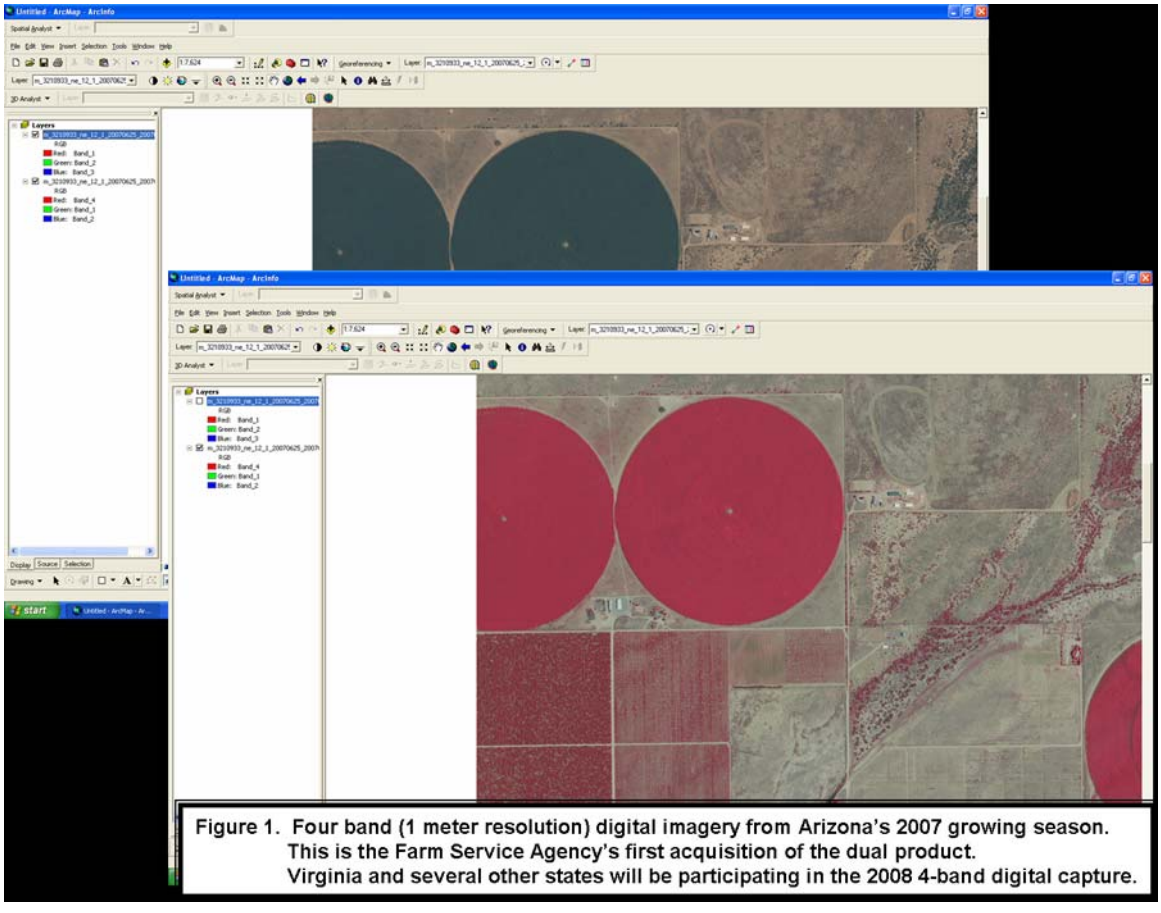

Figure 1. Four band (1 meter resolution) digital imagery from Arizona's 2007 growing season. This is the Farm Service Agency's first acquisition of the dual product. Virginia and several other states will be participating in the 2008 4-band digital capture.

VAMLIS

VAMLIS and VAPDC Reach Agreement for 2009 Conference Partnership

By:
Clay Wise,
Past President, VAMLIS

I am pleased to announce that Virginia Association of Mapping and Land Information Systems (VAMLIS) and the Virginia Planning District Commission (VAPDC) have agreed to combine their GIS conferences beginning in 2009!

In the past, there have been two GIS conferences in the Commonwealth trying to provide much of the same opportunities. Of the many GIS professionals and vendors that support the VAMLIS conference several expressed difficulty because of having to pick and choose which conference they would attend. Taking these comments to heart, VAMLIS contacted Wayne Strickland at the Roanoke Valley-Alleghany Regional Commission about re-opening dialogue with the VAPDC and working toward a single statewide GIS Conference. Over the past year we have worked through a number of concerns for both groups and I am proud of the fact that we will now have one GIS conference in the Commonwealth.

One conference will help all GIS professionals in Virginia by providing more diverse content, and a single event to look forward to each year. Currently, there will still be a one day VAMLIS event in May 2009 to accommodate our By-Law requirements for an annual meeting.

The larger combined effort for the 2009 Commonwealth of Virginia GIS conference will likely occur in the fall. The selection of the fall date is due to the logistics of organizing a conference of this size. Both organizations want to have enough time to put our best foot forward and have an extremely successful conference.

Thank you for your support and we look forward to seeing you at the Virginia mega-GIS conference in 2009!.

VGIN Update

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opportunity for collaboration this has become! Please see the related article in this newsletter.

As you can see, there are a lot of things going on at VGIN. We are striving to provide Virginia with access to the best base mapping products available. We can only do that with your valuable input and hopefully your support. As always, please feel free to contact any of the VGIN staff if you have any feedback or suggestions.

And the best news is that summer is just around the corner!

Higher Education

Funding Opportunity

Masters students enrolled full time are invited to apply for the AAG Cartography Specialty Group (CSG) Masters Thesis Research Grants. These grants are made available to promote scholarly research in cartography research by students enrolled in a geography or related degree program. Grants are available up to a maximum of $500 and may be used for items necessary and relevant to research such as travel, materials, equipment, and human subject fees. Deadline for application are *June 15th, and November 1st*. For more information and the application form, visit the CSG web site at:

http://www.csun.edu/~hfgeg003/csg/

Appomattox County's GIS Implementation

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application matrix , was that it provided a path, but no timeline. The timeline was left up to the locality to decide how fast or how slow to move towards the ultimate goal. In addition, the strategic plan highlighted applications that were considered to be 'low hanging fruit' which could be easily implemented.

As we walk along the path...Success!

Since December and the success of getting the Board of Supervisor's buy-in on the project, many staff members have begun to take advantage of the data assets that we already have in place. We are excited about the future possibilities, and the potential government efficiencies associated with these tools.

In the Planning Division, permits for new dwellings are currently being plotted to help show growth patterns, the Building Inspection Division now uses GIS to search for different soil types, the Solid Waste Department has had its convenience center sites mapped, and a proposed recreational trail has been mapped in a county-wide trial plan that connects the Town of Appomattox to two other destination points, the county's Community Park and Appomattox Courthouse National Historic Park.

In the new budget year we will begin to purchase new equipment and software to further support the implemention of GIS with other departments. We are also outsourcing the development of our parcel layer, and will integrate parcel data assets with the Commissioner of Revenue's office data.

As we walk along the path to full GIS implementation, these tiny successes (remember, baby steps!!!) provide encouragement and show the daily benefits of having GIS as a fully functional platform to support the increased efficiencey and productivity of government in Appomattox county.

Save the Date!

ESRI Educational Conference
August 2-5, San Diego CA
http://www.esri.com/events/educ

ESRI International User Conference
August 4-8, San Diego, CA
http://www.esri.com/events/uc

VAPDC Virginia GIS Conference
September 29-30, Roanoke VA
http://www.vapdc.org

Urban and Regional Information Systems Association (URISA)
October 7-10, New Orleans LA
http://www.urisa.org/conferences/annual/program

2008 VAMLIS GIS Conference Poster Winners!

Pre-college Category:

First Place ($250): *911 address Verification for Page County*
Page County High School

Second Place ($150): *Analysis of the Spread of Galuim Trunicum*
Heather Kline's Geospatial Class - Clarke County High School

Third Place ($100): *Nitrate Levels in Lew Creek, Staunton, VA*
Shenandoah Governor's School

Higher Education Category:

First Place ($250)**:** *Kite Photography and Image Enhancement for Estimation of Productive Ground Cover in Virginia's Pastures.* Arvind Bhuta, Candice Luebbering, Andrew Foy, and James Campbell. - Virginia Tech

Second Place ($150): *Integrating User Input Into Regional Wine Tourism Maps* Katherine Pritchard, et al - Virginia Tech

Third Place *($100): Combating Lyme Disease Networks in Virginia.* Joby Kaufman - Virginia Tech

Professional Category:

First Place: *Priority Assessment of Major Programed Interstate and Primary Projects.* Ross Hudnall, Virginia Department of Transportation (VDOT)

Second Place: *Geologic Map of Rockbridge County, Virginia*. Gerald Wilkes, Edward Spenser, Nick H. Evans, and Elizabeth Campbell, Virginia Department of Mines, Minerals, and Energy (DMME).

Third Place: *Atmospheric Ca2+Wet Deposition Within the Continental United States and Implications for Soil Inorganic Carbon Sequestration.* Meggan Goddard(Google Earth), Elena Mikhailova (Clemson), Christopher Post (Clemson), and John Galbraith (Virginia Tech).

USACE: Hurricane Evacuation Restudy

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producing inundation areas that more closely match the surface.

- **TIN Accuracy** - Using the watershed areas as clips, TINs can be created for both the surge and the topography. The smaller areas allow for smaller file size and more datasets can be used. The more accurate the data set, the more accurate the TIN. However, a point can be reached where the data is so detailed that the resulting TIN becomes too difficult to work with and therefore is not useful. The trick is to balance the level of accuracy that is required by the study and is achievable with the data with funding and time allocated.
- **Grid Cell Size vs. File Size–** Using ESRI ArcMap's 3D Analyst extension, the TINs are converted to grids. The grid cell size can be manually set during the TIN to Raster conversion. The smaller the grid cell size, the larger the file size.
- **Matching Contours** - There can be a misconception that analysis of topographic data of an acceptable resolution will produce results that closely follow the contours. The areas that result from the raster calculation of the topographic grid and a surge grid are dependent on the cell size of the grids. If the grids have different cell sizes, then the resultant raster calculation will have a grid cell size that matches the larger cell size of the two grids. When the raster calculation is converted from a grid to a shapefile, the features can be smoothed. Larger cell sizes will have coarser edges.
- **Large Datasets** - The large datasets caused a delay in redrawing speeds, in TIN or grid creation and exporting and printing. This delay can be improved by moving the datasets to ArcSDE.
- **Incomplete Storm Tide Elevations** - There were areas within watersheds that did not have storm tide elevations. In these areas, storm tide elevations were duplicated to facilitate the TIN creation.
- **Vertical Datums** - Storm tide elevations provided by the National Weather Service/National Hurricane Center were referenced to National Geodetic Vertical Datum of 1929 (NGVD29). For all localities except York County, the elevations had to be converted to North American Vertical Datum of 1988 (NAVD88) using Corpscon, Version 6.0.[1]

US Army Corps of Engineers ® Norfolk District

For localities that did not have digital elevation data, U.S. Geological Survey (USGS) Digital Elevation Models (DEMs) were initially considered for analysis. However, the grid size (10 – 30 meters) proved to be too course for the level of detail required for this project. The digital terrain models (DTMs) produced through the Virginia Geographic Information Network (VGIN) were also considered. The DTMs were used to support the statewide base mapping effort for development of orthophotography in 2002. The DTMs did not meet national map accuracy standards for developing topographic contours and would require additional costs to do so, therefore they were not used. For these communities, storm tide elevations were hand delineated onto USGS 7.5 Minute Quadrangle Maps (1 inch equals 2000 feet) and then digitized into a Geodatabase. The USGS map was also used as the base map, providing planimetric and topographic information for the user.

The final storm tide maps support the Shelter and Transportation Analysis parts of the restudy, identifying roads and shelters that might be at risk for flooding. In addition, the storm tide maps and data are provided to local governments and the Virginia Department of Emergency Management in preparation for the hurricane season. Maps can be viewed by visiting Virginia Department of Emergency Management's website, http://www.vdem.state.va.us/threats/hurricane/stormsurge.cfm

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(Footnote)
[1] Corpscon, Version 6.0; http://crunch.tec.army.mil/software/corpscon/corpscon.html

Movin' On

We wish you all the best..

Alfredo Frauenfelder, formally the GIS Coordinator at Henrico County, has accepted a position in Boston with ESRI.

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