Implementing the Standard for the US National Grid in North Carolina

NSDI Cooperative Agreements Program

FGDC-Endorsed Standards Implementation Assistance and Outreach Project

October 8, 2008
Agreement Number: 08HQAG0027
Project title: Implementing the Standard for the US National Grid in North Carolina
Interim Report
Organization: North Carolina Center for Geographic Information and Analysis, 20322 Mail Service Center, Raleigh, NC 27699-0322, www.cgia.state.nc.us and www.nconemap.com
Principal Investigator: Mr. Zsolt Nagy, 919-733-2090, zsolt.nagy@ncmail.net

Collaborating Organizations:

Pasquotank County, NC. Julie Stamper, GIS Coordinator.
stamperj@co.pasquotank.nc.us   http://www.co.pasquotank.nc.us/GIS/index.cfm

Center for Interdisciplinary Geospatial Information Technologies, Delta State University, Talbot Brooks, Director. tbrooks@deltastate.edu
http://www.deltastate.edu/pages/298.asp

Public XY Project, Tom Terry. neri.terry@usmc.mil

City of Asheboro, NC. Drew Fioranelli, GIS Coordinator. dfioranelli@ci.asheboro.nc.us

NC E-911 Board, Ron Adams, Networking Technician. ron.adams@its.nc.gov
http://www.nc911.net

NC Emergency Management, Floodplain Mapping Program, Hope Morgan, GIS Manager. hmorgan@ncem.org , www.ncem.org

Executive Summary

The challenge for the project team is to implement the US National Grid, adopted as a state standard by the North Carolina Geographic Information Coordinating Council. The project has made significant progress. The team developed a draft set of training and outreach materials and custom files for GIS users. Outreach efforts are partly completed, including two workshops, one each for GIS and non-GIS participants, and a presentation to a conference of property mapping specialists. Workshops provided hands-on practice in reading a map with US National Grid. Workshop handouts included a CD with custom GIS files and maps. Additional outreach as well as a session to train potential trainers will be achieved later in the project. Project collaborators have expanded their online resources since the beginning of the project, and the team has made progress in customizing online resources to be available through www.nconemap.com. In particular, the project has added US National Grid functionality to the NC OneMap web map viewer. USNG coordinates will be displayed for a point of interest, there will be a USNG look-up tool, and USNG coordinates will be displayed with the address look-up tool.

Project Narrative

A. Purpose

The purpose of this project is to implement the US National Grid (USNG), an FGDC standard (December 2001) which was adopted by the North Carolina Geographic Information Coordinating Council in 2007. The objectives of the project are to:

- o Engage and train local and state government map users to be able to read maps with USNG and to value the grid as a informative reference for emergency management and other local and state business processes.
- o Enable key professionals to serve as trainers in using and reading the USNG.
- o Expand online and desktop resources that include the USNG for both map makers and map users.

B. Activities

The project activities through September 2008 are the following:

CGIA established a project team for technical advice and implementation assistance based on known interest in USNG and related issues as well as experience with intended workshop participants.

        Julie Stamper, Pasquotank County
        Talbot Brooks, Delta State University
        Drew Fioranelli, City of Asheboro
        Ron Adams, staff to the NC E-911 Board
        Angie Schulz, Raleigh-Wake 911
        Zsolt Nagy, Tom Tribble and Jeff Brown of CGIA
        Hope Morgan, NC Emergency Management
        Gavin Smith, Center for Natural Disasters Coastal Infrastructure and Emergency
        Management, UNC-Chapel Hill
        Steve Strader, USGS Liaison for NC
        Tom Terry, Public XY Project

CGIA and the project team developed training materials in preparation for outreach activities:

- o Lesson plans and presentations for GIS users and non-GIS map users.
- o Custom NC GIS map templates and base datasets for UTM zones
- o Practice maps and grid readers (rulers formatted for USNG)

The project team developed North Carolina geospatial datasets (point locations) with USNG coordinates included as an attribute using the Military Analyst GIS tool (free download of extension for ArcGIS). The point locations include:
- o NC public schools
- o NC potential shelters
- o Emergency operations centers

For example, public schools are shown on a training map with USNG (Figure 1).
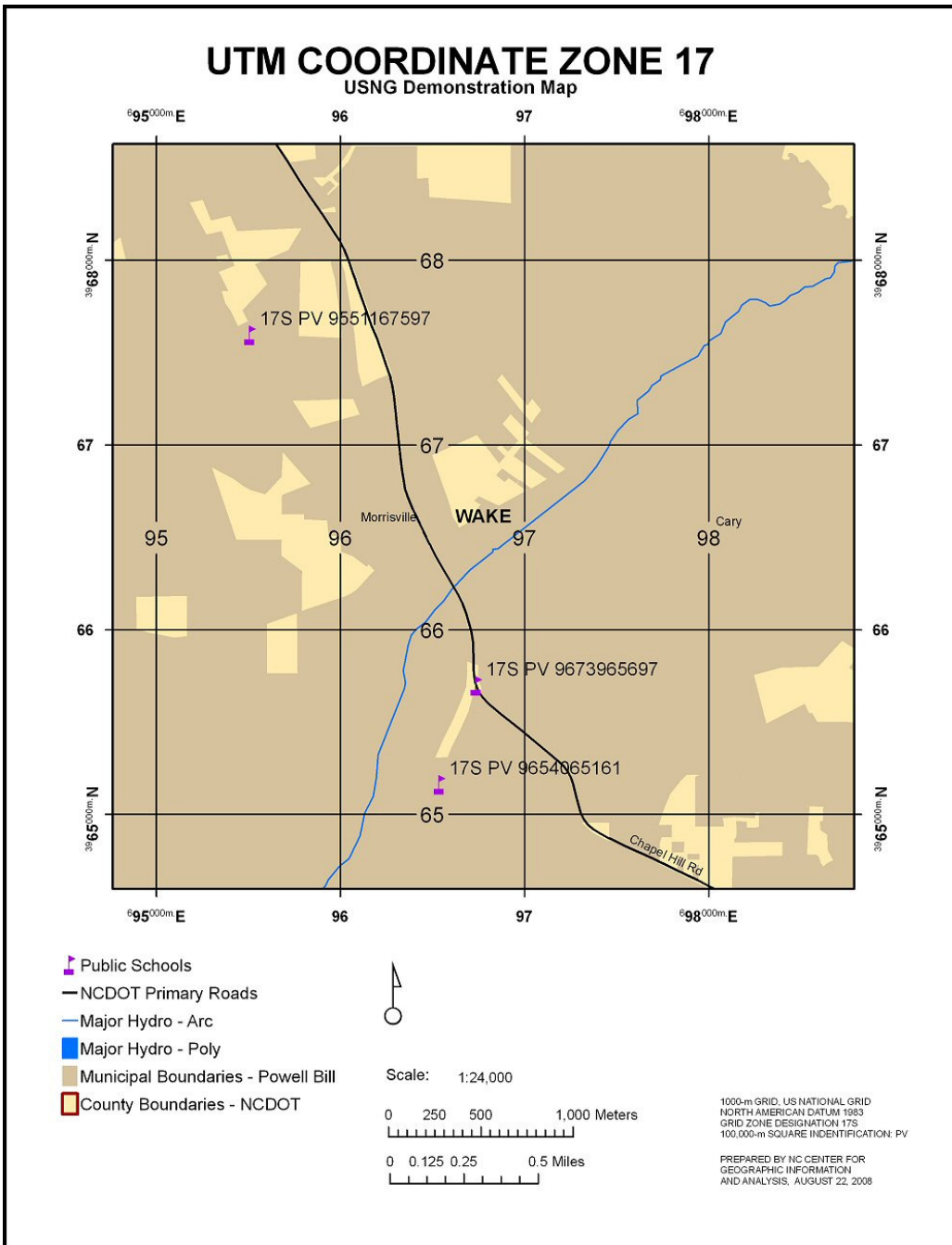

Figure 1. Training Map with Public Schools and USNG

The project team held three training events:
- o Carolina Urban and Regional Information Systems Association (CURISA) and NC Geospatial Information and Technology Association (NC GITA) in Concord, NC (September 7, 2008). This 2-hour workshop for GIS users was led by Julie Stamper, Drew Fioranelli and Jeff Brown. Talbot Brooks was unable to attend as planned due to illness.
- o North Carolina annual meeting of National Emergency Numbering Association and the Association of Public Safety Communications Officials (NENA-APCO) in Sunset Beach, NC (September 9, 2008). This 2-hour workshop for non-GIS users was led by Jeff Brown and Tom Terry. Talbot Brooks was unable to attend as planned.
- o North Carolina annual meeting of the Property Mappers Association in Raleigh, NC (September 30, 2008). This 20-minute segment for a mixture of technicians and managers was led by Jeff Brown.

The project team plans at least two additional presentations:
- o North Carolina Emergency Management Association (March 2008)
- o North Carolina GIS Conference (February 2008)

During the next six months of the project, the project team will conduct a session to train trainers in the application of USNG in NC. The partners will identify key personnel and potential applications of USNG.

The project team distributed the training materials and geospatial datasets noted above to workshop participants on CD. Outreach will also include descriptions of tools and techniques on the NC OneMap website, links to the training materials and links to partner websites.

C. Challenges

To date, the project has identified five main challenges based on discussions in workshops and ancillary conversations.

1. Highlight the benefits of using the US National Grid in local government operations and identify the protocol for applying the USNG in emergency preparation and response.

   The USNG provides a framework for consistent, reliable representation of location on the ground, particularly for search and rescue and other emergency response and recovery operations occur. One workshop participant noted that local officials may be familiar with all locations in a jurisdiction, but that extensive damage to familiar landmarks and structures may be disorienting. In addition, outside assistance in the form of mutual aid from other local governments or emergency response by state and federal organizations, having little or no familiarity with specific locations, would rely on informative maps. Another workshop participant noted that non-disaster opportunities to benefit from maps with USNG include search within large recreational areas. The project

will identify opportunities to include USNG in local and state emergency protocols.

2. Clarify the benefit of using USNG instead of a grid based on NC state plane coordinates.

   Land records management in North Carolina is closely related to tax mapping and surveying. The NC Geographic Information Coordinating Council adopted a state standard for cadastral mapping that includes the NC state plane coordinate reference system. Practitioners work with NC state plane coordinates on a daily basis and in some cases have generated grid maps based on coordinates in NC's single state-plane zone. Outside assistants will probably not have had experience with NC state plane grids. Investing time in creating map products with USNG, even in addition to maps based on state plane grids, would pay off in a crisis when local emergency managers would have the tools to integrate successfully with National Guard and other outside aid for which USNG is a preferred reference.

3. Define practical ways to implement the USNG in local government operations that do not replace current business operations and do not burden E-911 communicators and first responders.

   Digital maps and online resources are valuable local tools. In addition, hardcopy maps continue to be practical and useful in search and rescue and other emergency operations. The most effective way to implement USNG for emergency operations appears to be production of a map atlas for a jurisdiction. For example, Pasquotank County produced a county atlas that features a street index with reference to USNG grids (see example in Figure 2). The maps have the USNG grid lines displayed over county base maps. The GIS coordinator revised the atlas in September 2008 so that all maps were at a scale of 1:24,000 for consistency and to enable users to apply the grid readers (rulers that use Romer scale V6) to determine USNG coordinates on the maps. Talbot Brooks confirms the utility of USNG map atlases in the field in Mississippi and he places emphasis on map book creation and standard mapping scales in his training materials. The project team will look for successful applications of USNG that do not require significant changes to E-911 dispatching operations and do not place a burden on E-911 communicators and local emergency managers.
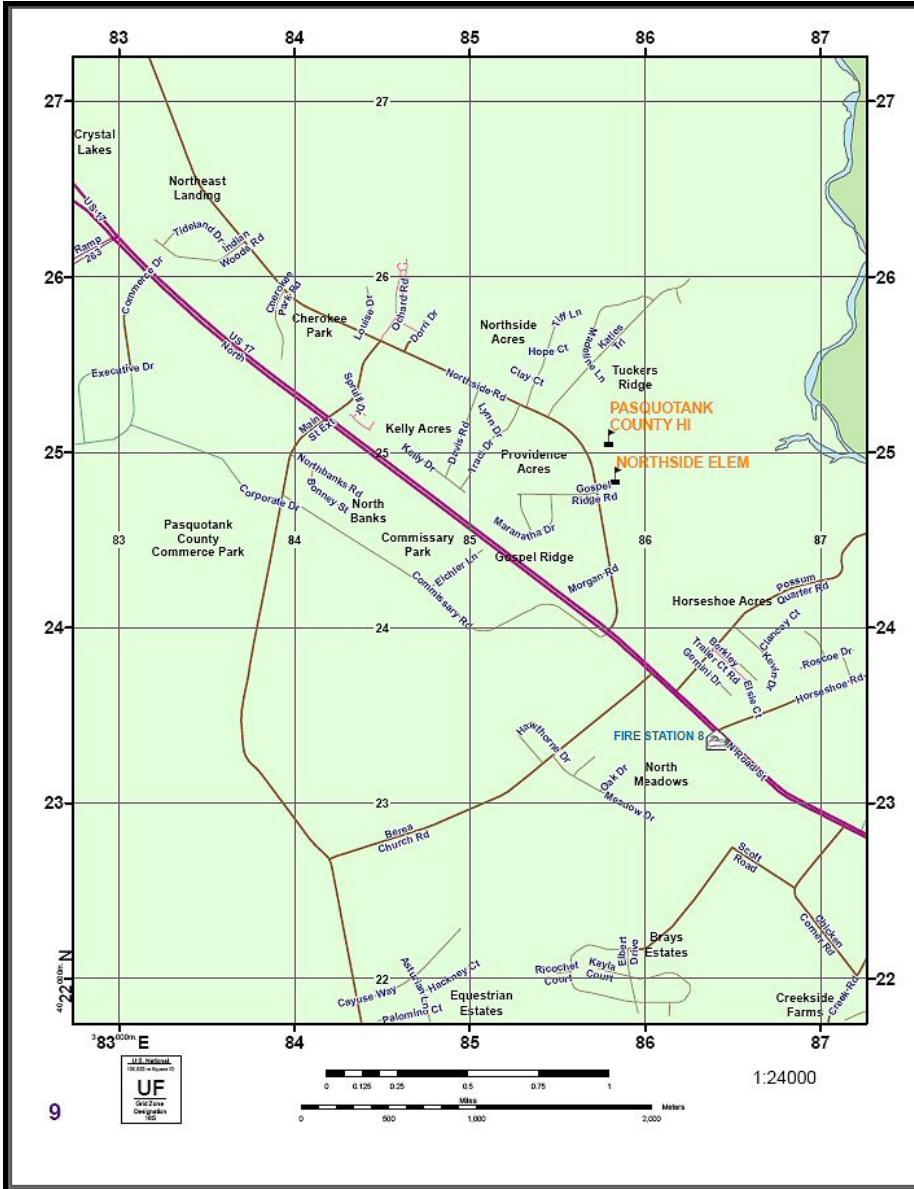
Figure 2. Street Atlas with US National Grid, Sample Page, Pasquotank County, NC

4. Find practical ways for commercial software providers to add the USNG
    coordinates to information that is displayed in commercial E-911 computer aided
    dispatch (CAD) and GIS software products.

    Observation of software providers exhibiting at the combined North Carolina
    Annual Meeting of the National Emergency Numbering Association/APCO
    indicated that at least one provider already displays the Military Grid Referencing
    System coordinates (equivalent to USNG) in a results window in a CAD
    interface. The most relevant functionality would be to display the USNG
    coordinates at a location of interest along with latitude/longitude and other
    location attributes. If requested, the E-911 communicator could report the

coordinates from the display. Providers indicated that the addition of USNG coordinates for a point of interest would not be complicated to add. The inclusion of USNG could be added to the NENA standards and the providers would modify products to meet the requirements.

GIS software providers have varying capability to integrate USNG. ESRI's ArcGIS is the most widely used GIS software among North Carolina local and state agencies according to the NC GIS Inventory (powered by Ramona)   The ArcGIS software integrates USNG in layout functionality, and offers a free extension (Military Analyst) as a useful tool for USNG. Functionality related to geospatial data projections is essential for easy integration of local and state data into a map layout with USNG grid lines. The project team will seek more information about other GIS software packages and USNG functionality.

5. Improve and Expand Online Resources

Further developments in tools and techniques are ongoing at Delta State University. The project team sees a need for a revised mapping style sheet to clarify the user steps required for effective map books.

Pasquotank County's GIS website http://www.co.pasquotank.nc.us/GIS includes a section on US National Grid maps and local examples of how to use USNG. The challenge of drawing attention to online resources is exemplified by an anecdote: following participation in the NENA/APCO workshop, the E-911 coordinator in Pasquotank County met with the GIS coordinator again to find discuss the use of USNG in the county's Computer Aided Dispatch system.

The NC OneMap project team added three functions to the NC OneMap viewer (www.nconemap.com) related to the US National Grid as illustrated in Figures 3-8. The map viewer now has USNG coordinates that display for the location under a users mouse location on the map. The second function is a query tool into which a user may enter USNG coordinates, generating a point and label on the map. The third function is the display of USNG coordinates in the results of an address look-up. These NC OneMap functions will serve as a resource and raise awareness of the USNG as a reference tool for geospatial data in North Carolina.
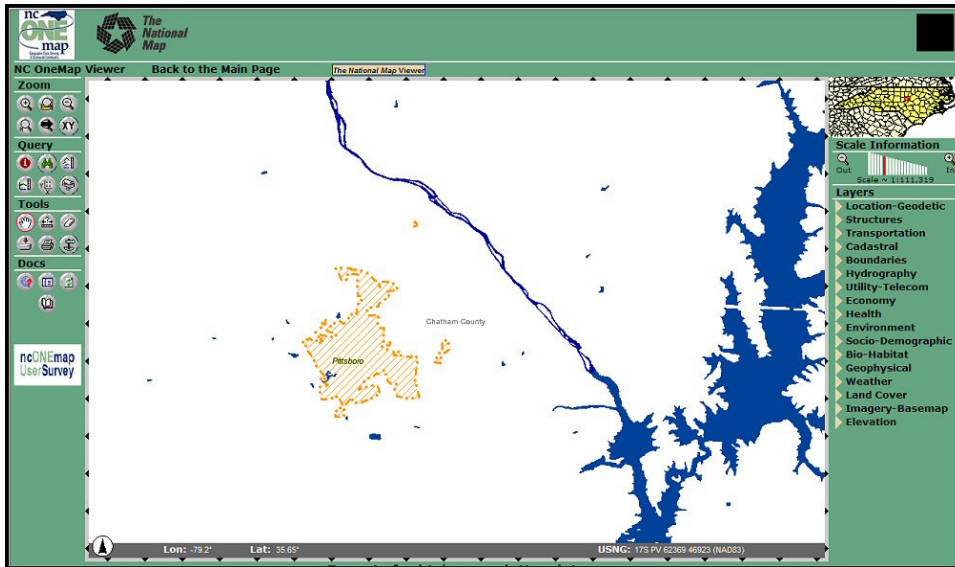
Figure 3. NC OneMap Viewer, September 30, 2008, with USNG Coordinates Displayed on the Lower Right for Mouse-Over Location of Interest
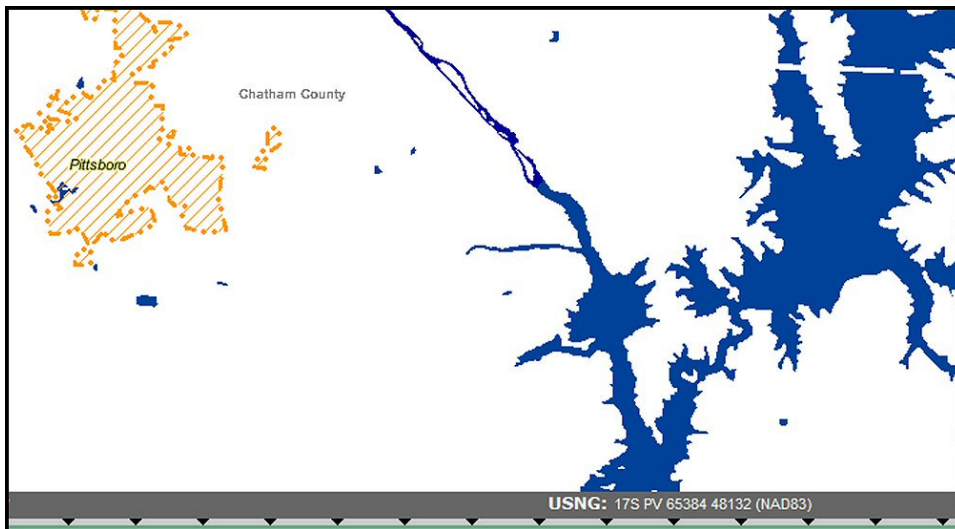

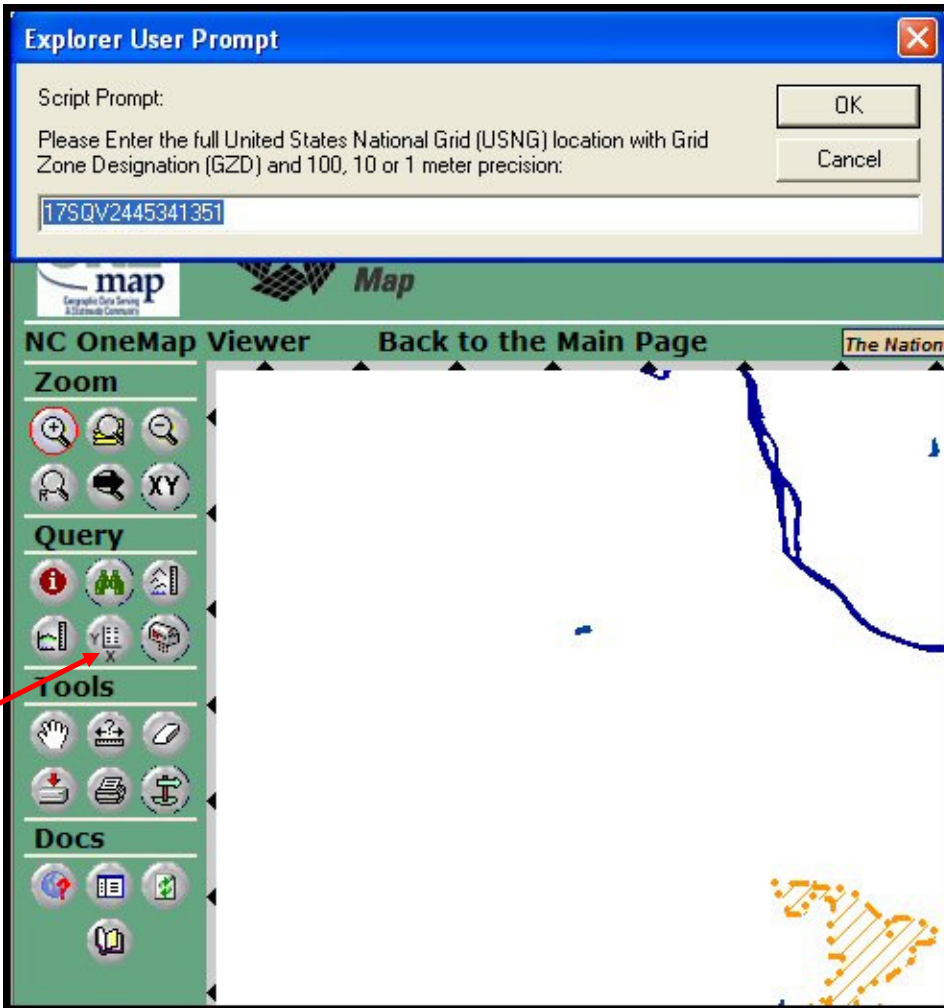**Figure 4. Detail Showing USNG Coordinates on Lower Right for Mouse-Over Location of Interest**
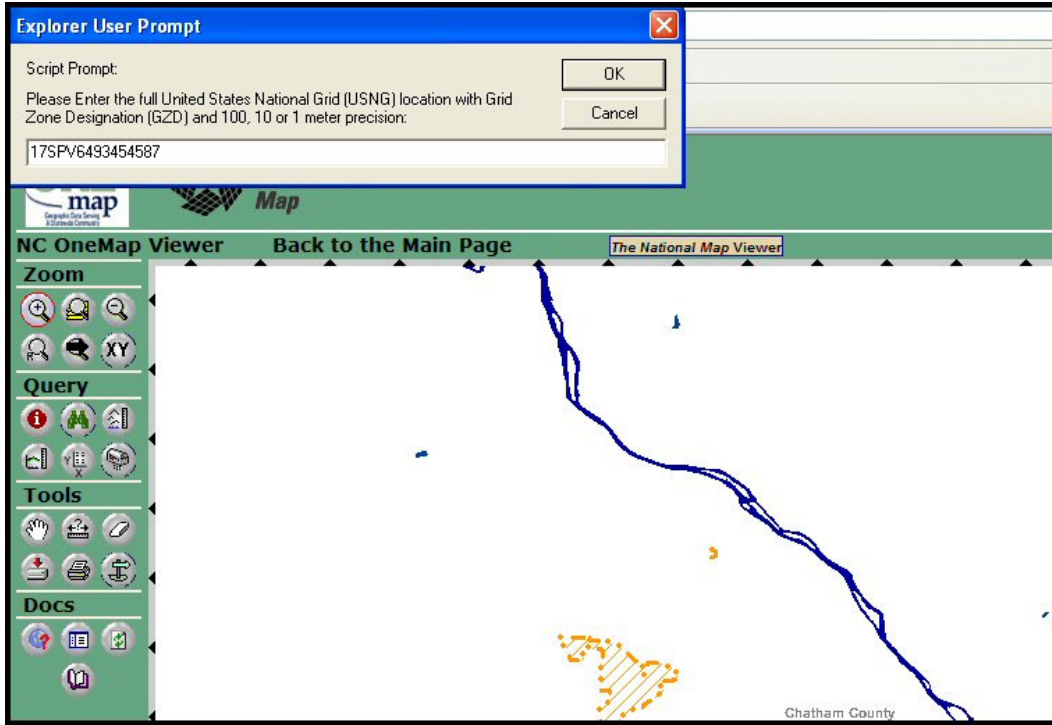
Figure 5. USNG Look-Up Query Tool in NC OneMap
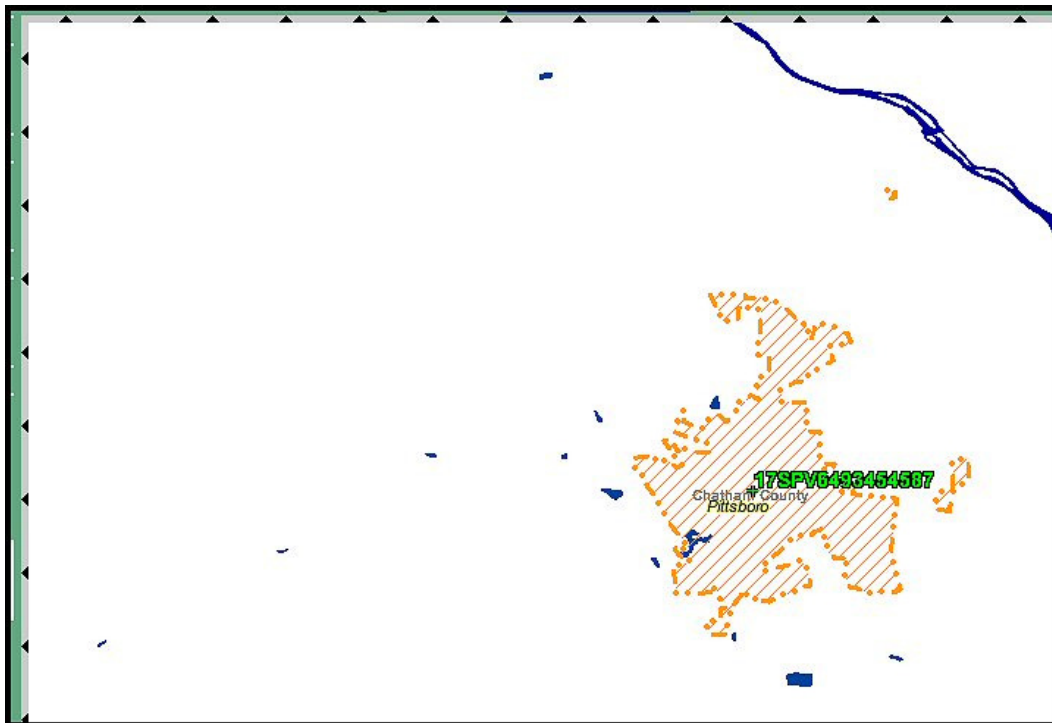
Figure 6. Entry Box for USNG Coordinates of Interest

Figure 7. Location of Interest on the Map with USNG Coordinates

Goto	Address	X	Y	USNG
Goto	66 Oakwood Dr, Chapel Hill, NC 27517	-79.021505	35.916044	17S PV 78517 76445 (NAD83)

Figure 8. Third Function: Addition of USNG Location in Results Window from Address Look-Up Tool in NC OneMap

D. Supplement for FGDC-Endorsed Standards Implementation

The development approach for structuring and organizing implementation resources was to obtain and synthesize materials from project collaborators, customize materials as necessary for a North Carolina audience, and develop new resources to support GIS users and potential trainers.

Delta State University, Pasquotank County, the Public XY Project and NC Emergency Management had slide presentations, printable maps, GIS datasets, map layout guides, and grid readers ready to share with the project team. CGIA drafted lesson plans for GIS and non-GIS workshops based on FGDC templates courtesy of Lynda Wayne (GeoMaxim), the NSDI Training Program Manager. The project team reviewed the lesson plans and made modifications, particularly to the lesson plan for emergency communicators and responders.

The team combined and customized the ingredients to produce presentation materials to fit the lesson plans and to customize handouts to supplement the sessions. FGDC presentation templates were useful as a framework. In addition, CGIA developed GIS files specific to the three UTM zones in North Carolina and created simple map templates for application by local GIS users. Additional work is needed on packaging materials for potential trainers.

The materials were reviewed by the collaborators listed above as well as the City of Raleigh's E-911 trainer, Angie Schulz, prior to the first workshop. Although testing was not carried out before the first workshop for GIS users, feedback from that session guided modification of workshop materials to clarify some of the concepts before the second workshop.