

## **FINAL REPORT**

# **GIS Coordination and Standards Management**

Report prepared by  
Pinnacle Consulting Group  
A Division of North Wind, Inc.

Submitted to  
Saluda-Reedy Watershed Consortium

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[www.saludareedy.org](http://www.saludareedy.org)

## **Project Background**

The Pinnacle Consulting Group (Pinnacle) - A Division of North Wind, Inc. was tasked to provide Geographic Information System (GIS) support for Saluda-Reedy Watershed Consortium (SRWC) partners, subcontractors, and associated projects. Pinnacle provided support in the form of mapping for various projects, working with project partners to establish common GIS standards where necessary, research into available GIS data and imagery in the Saluda-Reedy Watershed (SRW) and development of maps for pertinent features in the watershed such as roads, wetlands, water bodies, and many others.

The first step in this project was to assess data requirements for existing and anticipated SRWC projects. Next we surveyed available data resources, and began the process of acquiring and compiling data critical to project support.

## **GIS Data Research, Acquisition and Analysis**

Known GIS data servers such as those available from the South Carolina Department of Health and Environmental Control (SCDHEC), the University of South Carolina (USC) and the South Carolina Department of Natural Resources (SCDNR) were first examined for available data pertinent to the SRW. Data from these sources that was found to be necessary for SRWC activities were downloaded to Pinnacle's servers for storage and use. Pinnacle's servers are backed up twice daily with in-house records and once weekly with off-site records.

As expected, we identified duplicate data for many themes (rivers, municipalities) but at different scales and dates of origination. Due to this it was often common for several data layers of the same theme to be downloaded and then compared so a decision could be made as to which data layer was the most appropriate for SRWC activities. Often one data layer at a certain scale would be used for watershed wide activities and finer scale or more detailed data would be used for more localized activities.

Data from SCDHEC, USC and SCDNR were often generated on a state-wide scale. Because of this scale, GIS data retrieved from these sources could have questionable accuracy when large scale mapping was needed. To deal with this problem, finer scale data was acquired where available, specifically from Greenville and Greenwood counties. These counties were chosen for finer scale data acquisition for several reasons including population density, availability of data, and location of current and future specific SRWC projects. Data for other counties was either not available (Abbeville, Newberry and Laurens counties) or deemed not necessary for acquisition at this time.

Imagery and other data layers for Greenville County were generated and/or updated in 2003. Imagery and data for Greenwood County were available from different dates. Imagery was acquired for Lake Greenwood areas from 2003. Other data layers had mixed dates.

A listing of major categories of data downloaded to the SRWC GIS server is provided as Appendix A.

## **Mapping Activities**

Once GIS data was captured and analyzed, it could be used to create map products for SRWC partners' use. A set of standardized maps were produced that included general watershed maps, hydrography maps, and road maps among others. Some of these maps were extensively proofed and made available for publication to the SRWC public and collaborative websites.

Non-standardized mapping to fill specific project needs and requests were also supported through this project. Specific requests came from Friends of the Reedy River (FoRR), the South Carolina Department of Parks, Recreation and Tourism (SCPRT), the Strom Thurmond Institute (STI) and Envision. Specifically, FoRR requested maps showing the Reedy River watershed tailored towards water quality, potential contaminant sources, flood plains, hydrography and public lands. SCPRT and STI requested maps to be used for educational processes and 3-dimensional mapping was produced for Envision for use in the SRW's brochure. Other specific mapping was completed for project partners that are not listed here.

In addition to maps produced solely with funding from this project, project funds were also used to support mapping and analysis activities for other funded SRWC projects. In depth watershed statistics that detail spatial distributions across the SRW were completed. These include examinations of hydrography, population, topography, watershed acreage, trout streams, National Pollutant Discharge Elimination System (NPDES) permittees, ground water withdrawals, interbasin transfers, SCDHEC and Environmental Protection Agency (EPA) monitoring activities and infrastructure. All maps and associated data are housed on Pinnacle servers.

## **List of Maps Produced and Publication Options**

Appendix B includes a list of maps produced with funding and assistance from this project. All maps can be modified to fulfill a wide variety of needs from SRWC partners. Modification time will be minimal considering the work that has already been performed under this project in regards to data assimilation, storage, and production. All maps produced have a variety of publication options. These include production of digital copies of maps in the form of jpg, tif or pdf. More advanced publication options include exporting GIS maps into a read-only version that can be viewed with a GIS viewer that is available as a free download.

## **Synthesis and Effect**

This project has been instrumental in the assimilation of GIS data pertinent to many SRWC projects. Without the previous and continued funding from this project several partners who do not have GIS capabilities would not have the resources they need to complete their projects. This project has also reduced redundancy and therefore has maximized dollar for dollar productivity.

## **Contact Information**

Questions regarding this report or the referred work can be directed to Steve Springs @ Pinnacle, [ssprings@northwind-inc.com](mailto:ssprings@northwind-inc.com) .

## **Appendix A**

### **List of Data Generated and Downloaded**

- 1999 NAPP infrared imagery watershed wide
- USGS 1:24,000 quadrangle maps
- USGS 1:24,000 hydrography (streams and water bodies)
- USGS 1:24,000 based NWI wetland coverages
- USGS 1:24,000 based land cover data
- USGS 1:24,000 hypsography (contours)
- US Census TIGER (Topologically Integrated Geographic Encoding and Referencing system) road data
- US Census TIGER hydrography (rivers and water bodies)
- US Census 2000 block groups
- US Census 2000 urban areas
- US Census 2000 cities and places
- National Hydrography Dataset (NHD) stream files
- USGS National Elevation Data (NED)
- USGS HUC 11 and HUC 14 watersheds
- USGS Reedy and Saluda River watersheds
- SCDHEC Bureau of Water known groundwater contamination sites
- SCDHEC UST (Underground Storage Tank) known groundwater contamination sites
- SCDHEC potential groundwater contamination sites
- SCDHEC navigable lakes and streams
- SCDHEC 401 permits
- SCDHEC public water supply wells
- SCDHEC sewer discharge points
- SCDHEC NPDES permittees
- SCDHEC underground storage tanks
- SCDHEC and EPA water quality monitoring locations
- SCDHEC biological monitoring stations
- Various imagery sources dating back to the 1930's – hardcopy maps have been scanned digitally for use in a GIS
- County data from several sources at varying scales
- Municipality data from several sources at varying scales
- Ecoregions
- SCPRT parks
- Lake Greenwood marinas

**List of Data Generated and Downloaded (continued)**

- Lake Greenwood shoreline
- Private schools
- Public schools
- Charter and Magnet schools
- EPA RF3 (River Reach version 3) river files
- Elevation points
- Trout waters
- 3 and 5 digit zip codes
- Water and sewer lines
- Precipitation stations
- Many other GIS data layers and imagery sets were downloaded in conjunction with this GIS project and other SRWC projects that are not listed here.

## **Appendix B**

### **List of Maps and Other Work Products**

- Mapping of the SRW and Reedy River watershed at several scales for use in various projects by partners
- Several 3D models of the watershed for use in the watershed brochure developed by Don Koonce
- Several zip code maps used by Clemson University Sociology researchers
- Analysis of an 1884 map of the City of Greenville
- Watershed wide landcover mapping using 1992 United States Geological Survey (USGS) data with an examination of the relationship between sewer and water lines and urbanized areas
- Mapping of urban areas based on 1990 and 2000 US Census data
- Mapping of HUC 11 (a watershed delineation used by the USGS) watersheds within the SRW and analysis of their size and stream flow characteristics
- Mapping of Lake Greenwood at several scales
- SRW and Reedy River watershed mapping at several scales to include 1999 National Aerial Photography Program (NAPP) infrared imagery
- Navigable Streams within the SRW
- 3D mapping of the Greenville Water System reservoirs
- Mapping of old mills around the city of Greenville
- Several views of the Reedy River between Traveler's Rest and Greenville for Friends of the Reedy River
- Examination and mapping of total population, road mileage and watershed area by county
- Hydrography mapping watershed wide
- Mapping of threatened and endangered species sightings – this data can not be distributed
- Numerous maps and resource queries used by SRWC Partner Conestee Foundation with regard to hydrology, sediment management, and characterization of certain vital candidates.
- Maps and resource information used by faculty and graduate student researchers at Clemson University.