CHARLES COUNTY Maryland

Spatial Systems Associates, Inc. develops a robust *Geographic Information System (GIS)* for Charles County's Stormwater Management

Charles County, located just outside of the District of Columbia in Southern Maryland, is home to close to 150,000 residents. The County covers roughly 460 square miles consisting of largely rural areas with the Potomac River running along its western shoreline. A majority of Charles County's development has taken place in the densely populated northern half of the County, seeing an annual population growth of around two percent.

THE CHALLENGE

Charles County Government is subject to a National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Permit, issued by the Maryland Department of the Environment (MDE). The Charles County Department of Planning and Growth Management coordinates the implementation of this permit. New MS4 permit coverage includes the entire area of Charles County. This is an expansion over previous permit coverage, which was limited to approximately 82 square miles of the County identified as the Development District. The MS4 permit contains conditions which require, or are dependent upon, several comprehensive and accurate Geographical Information System (GIS) datasets. The County had some existing datasets that were used as part of the maintenance of the MS4 permit; however, spatial inaccuracies and missing data resulted in the entirety of the dataset needing to be updated. Additionally, the new requirements stipulated by MDE needed to be researched, analyzed, and populated within the County's NPDES geodatabase. To complete this requirement, Charles County contracted Spatial Systems Associates, Inc. (SSA) to assist in developing a robust geographic information system

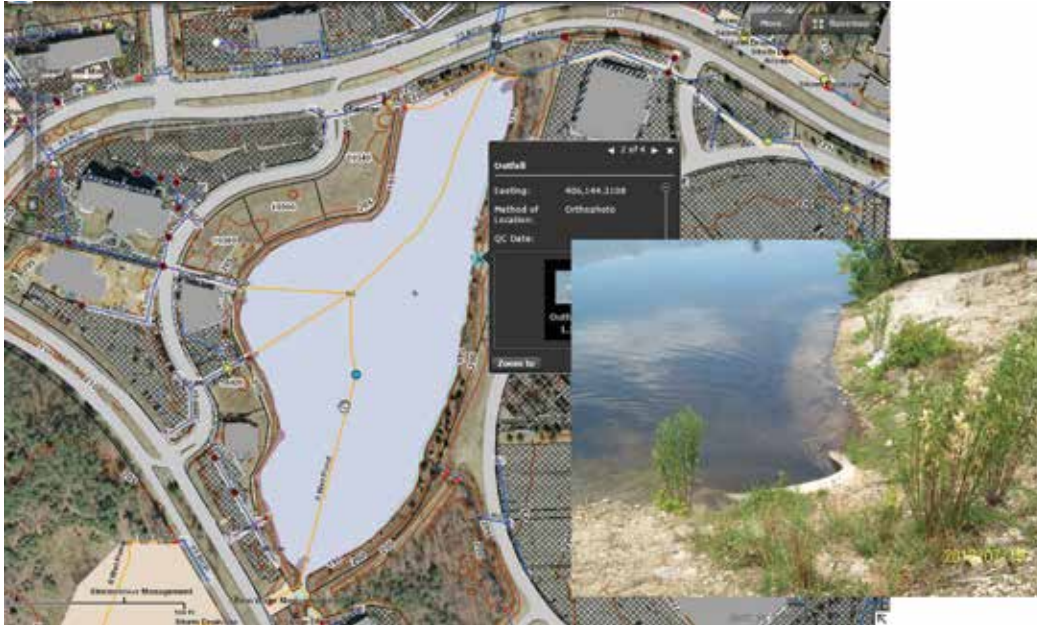(GIS) to provide the Department with necessary data to maintain their permit.

THE SOLUTION

SSA established a two-way replicated database environment with the County so that concurrent edits to the data, by SSA and the County, could be synchronized on a regularly scheduled basis.

To assist the County in meeting the requirements of their MS4 Permit, SSA started out with establishing the geodatabase design, which was a combination of the data model developed by MDE and custom fields and tables that were critical to the County's management of their stormwater infrastructure. SSA then reviewed all existing data to determine accuracy and completeness of the dataset prior to importing it to the new geodatabase. Once the existing data was loaded into the geodatase, SSA established a two-way replicated database environment with the County so that concurrent edits to the data, by SSA and the County, could be synchronized on a regularly scheduled basis. SSA then began the data modification and creation process. This included reviewing the County's as-built data (3,000+ plan sets) and vectorizing all stormwater infrastructure (pipes, inlets, man-

holes, etc.), best management practice facilities (BMP), environmental site design locations (ESD), water quality improvement projects (WQIP), monitoring locations, and outfalls. All attribute information that could be derived from the source documents (length, diameter, invert elevations, slope, capacity, etc.) were populated in the geodatabase. Additionally, using the as-builts, researched land records, and plat information; SSA captured all stormwater easements using coordinate geometry (COGO) information.

In addition to the stormwater infrastructure and maintenance location information, SSA was contracted to perform updates to the County's planimetric dataset to address inconsistencies and landscape/development changes that had taken place. SSA subcontracted BAE Systems to perform traditional photogrammetric data extraction using stereoimagery to delineate the planimetric updates. Following this process, SSA then developed an impervious surface dataset to be used for treatment analysis required by their MS4 permit. The impervious dataset was also used to analyze the contribution levels in calculation of a stormwater utility fee.

Part of the County's MS4 permit requires the development of drainage areas for various stormwater assets including BMPs, outfalls, forest conservation easements, and monitoring points. SSA developed these boundaries using the County's LiDAR data and a series of geoprocessing models providing a streamlined,

repeatable approach. This automated process not only delivers drainage consistency between the various boundary feature classes, but also allows for quick re-calculation as new infrastructure is added to the geodatabase.

There are many County staff members that need access to the stormwater data on a regular basis. Most of these individuals are not GIS users, rather engineers, locators, planners, administrators, and managers. To accommodate this broad makeup, SSA developed a web application that delivers all of the stormwater data in a centralized, easy to use environment. The applications services are tied directly to the enterprise data as it is edited, giving the County a "real-time" look at the data. This not only provides the latest information, but a level of transparency displaying the exact status of the project as it progresses. The application allows the County to search for particular stormwater assets, as well as run tracing analysis, BMP inspection analysis, and drainage area analysis. The easy-to-use application provides to this broad group access to data that they may otherwise not know was available.

The County has established a strong multi-department enterprise GIS environment that can provide critical assistance in their management of business processes. By developing a centralized data source that is actively maintained, the County is able to better collaborate and streamline approaches as they submit their regulatory requirements.