



WHITE PAPER

## **MAKING GIS PAY-OFF FOR A SMALL WASTEWATER DISTRICT**

BY CHUCK DUFFY  
DUDEK

**I**s it cost-effective to implement GIS for small districts with a limited number of users and relatively small amounts of data? For the Rancho Santa Fe Community Services District, a small-scale GIS implementation successfully met the need to make information more accessible, more useful and easier to add as the district grows. This paper discusses the reasons for using GIS, software selection and the lessons learned throughout the implementation and how they can be applied to other small-scale implementations.

### **BACKGROUND**

Located in north San Diego County, the Rancho Santa Fe CSD provides wastewater collection and treatment to approximately 1,900 customers through a collection system of 50 miles of gravity sewer lines and 10 pump stations. Before the GIS implementation, District staff accessed data on an AutoCAD-based district map and a paper-based atlas book comprising parcel map pages from the county assessor. The atlas book had the sewer collection system manually drawn and included data such as permit-bearing parcels, easements and reimbursement agreements. More information resided in the District's 1999 Master Plan that used a GIS-based hydraulic model, including mapping of the collection system and basic attributes such as pipeline diameter and invert elevations.

District management and operations staff wanted GIS to provide better access to existing information and the ability to map expansions and collect attribute data. They wanted a simple solution to view, query and identify features within the collection system and to investigate underlying base layers as needed.

Dudek, an engineering and environmental firm located in Encinitas, California, was retained to prepare the GIS mapping effort. Dudek has a long history of working with the District, having prepared the original skeletonized hydraulic model and master plan. To begin the effort to convert the mapping system

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to a GIS, Dudek staff performed the digitizing and data collection effort for the entire district collection system. The firm also advised District staff to use ESRI ArcExplorer, the free viewing/querying software, for two reasons: cost and ease of use.

The next phase of the GIS implementation involved converting the District's paper atlas book to a digital format. Based upon experience with other clients, Dudek recommended using the "Mapbook" developer sample extension from ESRI as a template. This extension is flexible enough to accommodate a number of special conditions associated with the atlas book. The first condition was the District's desire to base the atlas book on the County assessor's parcel book pages, not on a rectangular grid. Each page is potentially at a different scale, and/or rotation. A special index layer was created specifying the desired scale and rotation for each page. Geodatabase annotation was created to store labels for a number of features. These features included data such as pipeline diameter and material, manhole depth, parcel numbers, assessor's parcel book and page numbers, and adjacent page numbers. Through the use of the "DS Mapbook" extension, and additional Visual Basic programming, the annotation layers were turned on or off based upon the scale and rotation of the current page. This extension made it easy to view and print any page. Pages could be added as necessary to accommodate growth. ArcPublisher/ArcReader system was deployed to enable District staff to access the geo-database annotation. Dudek staff uses ArcReader to maintain the data, including adding new facilities or updating the base data, and provide District staff with an update by simply exporting a new ArcPublisher document.

## **CHALLENGES**

GIS development at the District faced several challenges. The first challenge was converting existing CAD and hydraulic model data into GIS layers. The District and Dudek staff decided to use the hydraulic model data as the basis for the layers. Dudek staff went through all as-built improvement plans to verify the pipeline and manhole locations, and pull off all additional attribute data. In some cases, Dudek staff needed to verify facilities built in the 1930s which no longer had quality plans available for the pipelines. In these situations, the District staff and field crew knowledge was an invaluable resource.

The second challenge was the non-traditional page layout of the atlas books, and the District's desire to retain the format based on the assessor's parcel pages. A traditional, rectangular page layout generally has all pages of the same scale, with no rotation of elements with them. This caused an increase in the number of labels and annotation layers required for the atlas book. The solution was making a layer for each combination of scale and rotation in the book. As users switch between pages in the project file,

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these layers are turned on and off based on the rotation and scale of the current page. The improved controls for editing and working with annotation have been very useful for recent updates to the GIS. Dudek is in the process of converting some of the layers of annotation that are broken up by scale into single annotation layers that have a scale subtype.

## **USES & BENEFITS**

Today, the District uses the GIS mapping and database system as a one-stop-shop for a variety of mapping and data retrieval tasks which formerly required several steps to access. A major benefit has been improved response to customer inquiries because information can be accessed based on customer name, APN or site address. Data linked to the parcel base layer allows the District to retrieve customer information such as name, lot size, and connection status. With ArcReader's printing capabilities, District staff can zoom in on individual parcel areas to provide detailed maps showing the proximity of a parcel to existing sewer lines. These maps can also be pasted into an email for electronic transmission.

ArcReader software also allows the District staff to easily access the GIS layers with the most current version. Dudek staff handles more detailed queries and graphic creation requests, thus allowing the District staff to focus on day-to-day operations.

Another application is supporting fee collection. Data for permitted parcels is now added so collections records can be linked to the GIS to more closely track paid or delinquent accounts.

Plans call for expanding links to other data sources. For example, the District has a large number of sewer line reimbursement agreements with developers who have fronted the cost to extend sewer lines into new areas. By entering the reimbursement agreement data, District staff will be able to query a parcel and determine the total connection fee due. The actual reimbursement agreement could also be linked to the parcel.

The GIS mapping system and data will also be used to help coordinate and streamline field operations and maintenance activities, using the historical data compiled and adding new pipeline facilities which have been constructed. Having access to the database and maps showing pipeline location, sizes, and materials will speed cleaning and repair services. A yearly cleaning schedule can also be developed with emphasis on recurring problem areas to provide data on future capital replacement projects. Links to the actual improvement plans are also in the works. Another future capability is locating easements and related information to allow for better encroachment tracking.

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## CONCLUSIONS

The Rancho Santa Fe CSD project provided several important lessons about successful implementing GIS for a small district.

- The project should have a clearly identified return on investment, such as increased staff efficiency or reduced expenses. Implementing GIS is simply the tool to achieve the ROI goal, not the goal itself.
- The planning process should focus on first identifying district's needs and then selecting the appropriate scale of implementation and software. In Rancho Santa Fe's case, the needs included:
  - a one-stop-shop to view the sewer system and access the underlying database of information from the parcel map layer
  - querying all facilities in the GIS
  - a simple, easily accessible interface
  - creating a digital copy of the existing, much-worn, APN-based atlas book.
  - the ability to expand the system and database without starting from square one.
- The development process should be documented before work starts to serve as a guide to an efficient roll out that will meet the district's expectations. At the same time, the development process needs to remain flexible to accommodate changes that can occur due to unforeseen events.

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### About the authors

*Chuck Duffy is contract general manager of the Ranch Santa Fe Community Services District.*

*For more information about this article contact Dudek at [info@dudek.com](mailto:info@dudek.com) or 800-450-1818.*