WEB BASED ASSET MANAGEMENT THE FOR STORMWATER PROTECTION PROGRAM

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Abstract. DeKalb County is responsible to maintain and inspect over 150,000 public stormwater assets. It has been managing its stormwater inspections and maintenance records largely through spreadsheets and manual entry. DeKalb County inventoried their assets and made them available in GIS. With the stormwater inventory complete it was apparent that the County needed a more effective way to manage these activities. In 2012 DeKalb County teamed with ARCADIS to assist in developing a web-based asset management system. This system will provide the County with the ability to manage field activities against stormwater assets including: inspections, inventory updates, and reporting. The County has a defined standard operation procedure for performing MS4 inspections; they now needed a centralized system to manage them. ARCADIS is developing a web-based system on ArcGIS Server using HTML-5 API to accomplish this goal. The end result will be a stream lined system allowing access to the data, entry and execution of inspections, inventory updates and reporting to allow quick access to yearly MS4 permitting activities

INTRODUCTION

The Georgia Environmental Protection Division (GA EPD) has been given the responsibility by the United States Environmental Protection Agency (US EPA) to issue NPDES permits to medium and large Municipal Separate Storm Sewer Systems (MS4). Part of the requirements of GA EPD is for the MS4 to prepare a Stormwater Management Plan (SWMP) that addresses structural control measures, illicit discharge and detection and elimination, industrial facility stormwater runoff controls, and a highly visible pollutant source program. At the end of each permit year the MS4 must prepare an annual report to GA EPD documenting conformity to the SWMP. DeKalb County, Georgia must perform over 40,000 inspections and maintenance activities annually to meet the requirements. To date all inspection and maintenance records are prepared on paper and manually entered into a database. Because of the difficulty in quickly accessing inspection histories and creating inspection reports, a Geographically Linked Asset-Management System (GLAS) was needed.

Beginning in 2007 DeKalb County began inventorying the entire stormwater infrastructure, both private and public, and geo-coding it for GIS interface. There are over 290,000 private and public assets, not including those within the Cities, installed in DeKalb County.
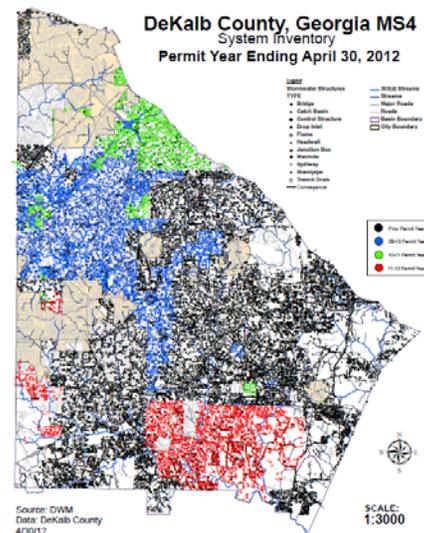

Figure 1. County MS4 inventory as of April 2012. Inventory was completed in July 2012.

To comply with the NPDES permit the County inspects a minimum of twenty percent (20%) of its assets every year. These inspections include permanent control structures (i.e. catch basins, headwalls, pipe conduits, ditches, and county maintained ponds), dry weather outfall inspections for illicit discharges, highly visible pollutant source businesses, industrial facilities that are required to have an NPDES permit, and privately maintained detention ponds.

Inspections. All MS4 inspections currently performed in DeKalb County are recorded on paper. Some assets can have up to three different types of inspections, and a lot of the information repeats such as the asset number, address, and inspector's name. Because the inspection records are all on paper, office personnel must re-enter all of the data into a database system for tracking and reporting.

Tracking. The current system that DeKalb County is using does not provide for an easy retrieval of historic

records. At the end of each year personnel must archive the database records. To locate a past inspection, one would have to open and search all of those archived files. If multiple inspections occurred on an asset during the year a lot of times the prior inspection was overwritten.

Reporting. The Watershed Protection Division within DeKalb County generates weekly, monthly, and yearly reports. The weekly reports are used for tracking inspector productivity. Reports are generated monthly to ensure that the county is on track to meet the end of year goals and annual reports are generated to report the GA EPD. Spreadsheets are updated and sorted daily to generate these reports.

Inter-departmental coordination. There are four departmental groups within the county that are linked to the MS4 assets. Roads and Drainage oversees maintenance and inspections of the existing assets, Watershed Protection tracks the inspections and prepares the annual report to GA EPD, GIS maintains the asset database, and Land Development provides as-built information on all new construction projects. Without careful coordination asset data can easily be misplaced.

GEOGRAPHICALLY LINKED ASSET-MANAGEMENT SYSTEM

With technology improving and the amount of time that inspectors and office personnel are spending entering and tracking data it only makes sense to move to an automated system. Arcadis and DeKalb County partnered to inventory all of the stormwater assets. With their knowledge of the county system and expertise in GIS, it was a pleasure being able to team up with them again. County staff members, familiar with the MS4 program and GIS, met with the Arcadis team and provided an overview of ideas on what kind of tool was needed.

Specific Program Capabilities. The County needed a faster mechanism to enter and record inspection data. The tool needed to be map based with the stormwater assets visible and selectable for inspection records and inventory updates. The geographically linked asset-management system (GLAS) needed to store a history of all activities related to the asset. DeKalb requested that GLAS include all MS4 types of inspections and be able to generate the GA EPD approved inspection forms. The map portion of the tool needed a search capability by asset number or street address. Due to the large number of reports that the county generates, it was determined that only a limited number of standard reports would be included in GLAS. The capability to export the data to a spreadsheet for additional reporting was a requirement.

Additional Program Capabilities. In addition to the items that the County had to have included in the program, there were others program capabilities that if possible would be beneficial. Having the capability for inspectors to use GLAS on a mobile device in the field would reduce the time filling out the paper forms and office time entering the data. Because the program is web based it could be designed for a tablet or other similar mobile device.

About GLAS. The program is designed on an Oracle database. This database stores all of the asset attributes and allows for the inspection records to be stored as well. Arcadis chose to use HTML5 to present the content on the World Wide Web. HTML5 is the fifth revision of the HTML standard and has been built with the consideration of being able to run on low-powered devices such as the tablet. One of HTML5's new features is the integration of scalable vector graphics. This allows the program to work well on an office desktop or in the field on a smaller screen tablet or other mobile device. Arcadis recognized that DeKalb County may not use all of the potential of GLAS at this time. However as the county is able to purchase mobile devices and train the inspectors on these units, the program should be using the latest technology for a seamless transition.

Mobile Application. Because GLAS was designed to use HTML5 with scalable vector graphics, this tool can be accessed in the field with a mobile device that has internet capability. In January 2013 DeKalb County, Georgia will be providing two android tablets to the watershed protection inspectors. This will be a pilot program to see how much productivity can be improved. By just adding these two tablets it will at a minimum reduce office data entry by 6 hours a week. Once at the asset, the inspector will be able to access the web based program. He will search the program for the asset and touch the screen to log the inspections. Because the data entry will be in real-time, reports can be run at anytime without having to wait on office staff to manually enter all of the inspection data into a spreadsheet.

Inventory Modifications. When a MS4 has over 290,000 asset records, some are bound to be identified incorrectly. As previously mentioned, the GIS department currently maintains the DeKalb County MS4 database. If a field inspector notes that an asset is mislabeled he must make notes about all of the changes and forward that information to GIS. GIS will then make the necessary changes as time permits. With GLAS, the inspectors will now have the ability to update the asset immediately. The only modifications that cannot occur in the field will be new inventory and location changes. GIS will make these modifications as necessary. A history of all changes and the inspector who made the update is recorded and kept in perpetuity.

Inspections. While the majority of MS4 inspections are related to the permanent control structures, there are four other inspection types that need to be recorded. DeKalb County requested that Arcadis include in GLAS the ability to all record all inspection types. Highly visible pollutant source businesses and industrial NPDES permitted business presented a particular challenge to the program. Unlike a permanent asset that is unlikely to change for many years, a business can quickly close or move locations. GLAS provides the County with the ability to assign any address with a business node. This node will contain all of the contact information, business type, and condition of the facility. The County also performs private detention facility inspections for maintenance compliance. All of the contact information is able to be recorded and assigned to the asset node for future review when needed. DeKalb County has an illicit discharge ordinance that prohibits non-stormwater discharges into the MS4. To ensure that illicit discharges are not occurring, inspectors will conduct dry weather monitoring on the entire county owned outfalls. If a flow is detected, samples are taken and given to the laboratory. GLAS will allow the inspector to log these dry weather flow inspections and note any illicit discharge.

Report Features. A large part of the MS4's responsibility is reporting. Currently DeKalb employees must export the asset data to a spreadsheet program. The inspection records are entered for the assets on a weekly basis. At the end of each week, reports are created to track the inspector's productivity. Additional reports are needed to ensure that the number of inspections being done each week will meet the year end requirements set by GA EPD. Arcadis listened to what was needed and integrated eight different types of reporting features. A GLAS user can quickly get structure, conveyance, pond, HVPS, industrial, and illicit discharge inspection history reports for any given time period. Two additional report functions that the County required were a scheduling report and the ability to reproduce the inspection records. The scheduling report will allow one to generate all of the assets in a given area that need to be inspected for that reporting year. The inspection record generator will populate the inspection data for the asset on the approved GA EPD form. These forms are provided to GA EPD in the annual report.

Figure 3. Example of a structure report from GLAS

CONCLUSIONS

The goal of this program was to increase inspector productivity and reduce the amount of time spent on data entry in the office. GLAS fulfills that goal and gives the County a tool that can be integrated with new technology as it becomes available.