# Reaching Retrofit Goals … One Step at a Time

## City officials in Tallahassee, Fla., carefully considered cost projections and public input to develop and implement a storm water pollution reduction program (SPRP)

*By Jason Maze, P.E., D.WRE*

*A spreadsheet based on three strategies was used to identify possible BMPs for target watersheds.*

Water bodies and the quality of their water are an integral part of the quality of life enjoyed by Florida residents. In the city of Tallahassee, segments of the community began voicing concerns regarding the potential impact of untreated storm water runoff on local waters.

This resulted in the inclusion of policies within the storm water management element of the city's then current comprehensive plan. The plan called for retrofitting all developed but untreated areas citywide in order to reduce the pollutants associated with storm water runoff. Despite these policies, the fiscal reality was that achieving such a broad retrofit goal would be extremely expensive, significantly exceeding the revenue capacity of the city's existing storm water utility and the community's willingness to allocate the necessary funding.

### Establishing a Foundation

Consequently, the city reconsidered, and Tallahassee's comprehensive plan was amended to establish a set of incremental steps for storm water retrofits, including milestone dates. The city commission directed its storm water management division (SMD) to initiate an SPRP to address the newly amended policies.

The objective of the SPRP was to provide a sound foundation of scientific, engineering and financial information related to water quality within the city's lakes and streams. This foundation would form the basis for city commission policy decisions regarding realistic storm water quality retrofit goals. In summary, the basic goals and objectives of the SPRP were to:

- Estimate annual pollutant loads to the city's lakes and streams and identify viable storm water best management practices (BMPs) that could be implemented to reduce those loads;
- Define and evaluate a series of BMP alternatives to reduce annual pollutant loads in targeted watersheds within Tallahassee, estimate their potential benefits/costs and develop citywide projections to achieve different levels of water quality treatment; and
- Conduct a series of public outreach activities to educate the community, assess the public's willingness to pay for water quality improvements, estimate the corresponding maximum possible service level and develop financial alternatives that account for the magnitude and timing of required capital investments.

### Pollutant Loads

The study area for the SPRP encompassed 145 watersheds, covering approximately 140,000 acres. The pollutant load assessment resulted in estimated loads for each watershed. The loads were ranked based on their average ranked load value for nutrients (the average of nitrogen and phosphorous rank values), metals (the average of copper, zinc and lead rank values) and solids (the total suspended solids rank value). Comparison values were computed for both annual load rankings and annual specific yield rankings to identify priority watersheds.

### BMP Alternatives

The next step was identifying conceptual BMP facilities at viable sites throughout Tallahassee to reduce annual pollutant loads. An inventory of

BMPs suitable for implementation was compiled as the basis for assessing potential pollutant reduction alternatives. These included: concrete grid, modular and porous pavement; dry and wet retention basins; wetlands; chemical injection treatment systems; grass strips and swales; sand filter media; exfiltration trenches; and various combinations to form a treatment train.

Ranges of capital facility construction and annual operation and maintenance (O&M) costs (based on city records) were developed in order to provide a basis for estimating the cost of new storm water treatment facilities. These values vary with the type of BMP being considered.

A BMP implementation model (Figure 1) was developed for assessing the potential impact and costs of individual storm water facilities proposed in a watershed. The model was created using a series of spreadsheets, with each row representing a potential storm water facility for the watershed. Cost estimates for construction and O&M were developed based on unit values established for the type of BMP. Annualized costs for each facility were computed in the implementation spreadsheet as the total of the annualized construction, land and O&M costs.

The final value developed for each facility in the spreadsheet was the estimate of the relative cost efficiency for comparison among the various facilities and alternatives. This value was computed as the annualized cost divided by the increase in treated area provided by the facility (equivalent treatment cost) and was expressed in terms of dollars per acre per year.

## Target Watersheds

A target watershed program using the 20 watersheds with the highest relative pollutant loadings within the city was developed as the basis for projecting the potential citywide benefits that could reasonably be expected. A series of conceptual BMP facilities for each target watershed was developed using a spreadsheet based on three different strategies:

***Strategy A.*** Use conventional BMPs on vacant, undeveloped property.

***Strategy B.*** Retrofit existing storm water facilities or construct new ones with chemical treatment (alum injection).

***Strategy C.*** Expand or construct new conventional facilities using privately owned property.

Suitable BMP facilities within each of the pilot watersheds were developed and evaluated relative to their watershed's level of development, topography, soils and land uses in order to assure that the BMPs could actually be constructed, operated and properly maintained to achieve expected annual load reductions.

The implementation model was used to assess the potential impact and costs of the individual storm water facilities proposed under each of the three BMP strategies. The model estimated the capital construction and annual O&M costs for each facility to provide the basis for evaluating long-term financial impacts. A unit cost approach was selected for citywide cost projections. The spreadsheets for the pilot watersheds were sorted by treatment cost efficiency.

A selection model was set up to search down the list of facilities in each of the watershed spreadsheets until the desired treatment level was met or exceeded (or the bottom of the list was reached). The selection model was evaluated at different desired treatment levels, and the resulting costs were summarized to develop average unit costs for each strategy.

An important part of projecting citywide costs was recognizing a maximum level of treatment that could be obtained within any watershed since not all land would be suitable for placement of BMPs.

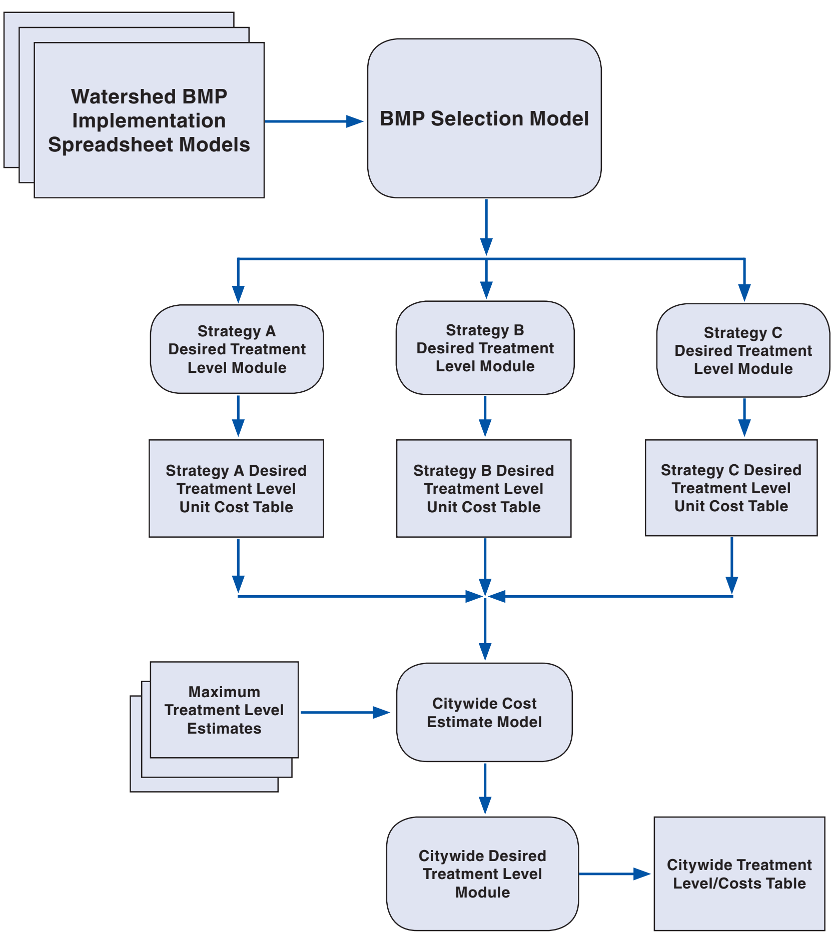


***Figure 1 – BMP alternatives assessment model flowchart.***

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