STATEWIDE STORMWATER TREATMENT RULE

By David A. Breitrick, PE

Land development in Florida is not getting any easier. A proposed Statewide Stormwater Treatment Rule by the Florida Department of Environmental Protection (FDEP) will be adding to the challenges of stormwater design and permitting. The intent of this article is to inform the land development sector of the proposed Rule, encourage interested parties to be proactive during the period of proposed Rule development, and empower those involved in land development in any capacity with the knowledge of the potential impacts of the proposed Rule.

The FDEP has taken the lead in addressing the increasing nutrient enrichment of Florida's surface waters and groundwater. To that end, the FDEP has initiated the proposed Statewide Stormwater Treatment Rule to increase the level of nutrient removal required of stormwater treatment systems serving new development, including urban redevelopment.

The proposed Rule is currently under development and the specific design parameters and criteria are subject to change prior to their effective date, tentatively scheduled for July 2009. Therefore, highlights of the proposed Rule changes having an impact on land development will be presented in this article in general terms.

Land developers and their engineers should be aware of the upcoming proposed Rule because of the cost implications to the stormwater component of developing land in Florida. The proposed Rule will encourage the use of pre-treatment devices and impose more restrictive water quality requirements. Pre-treatment components may add cost to a stormwater system. More restrictive water quality requirements may require a larger percentage of land area to be utilized for stormwater treatment.

A Technical Advisory Committee (TAC) has been created to make recommendations to the FDEP about the proposed Rule. The TAC consists of approximately 21 members and 15 alternate members from various statewide interests including the Florida Engineering Society; Audubon Society; City, County and State Agencies; and the Home Builders Association, just to name a few. The TAC is addressing a number of issues that may result in changes to the Rule as presently proposed.

The TAC has laid out a schedule of meetings and workshops leading up to their recommendation to the FDEP prior to adoption of the Rule. Workshops have taken place on March 5, 2008, April 16, 2008, May 28, 2008 and July 9, 2008. At the time of this writing the next session will take place on September 15 and 16, 2008, which will have taken place by the time of issuance of this article. The next two sessions are scheduled on October 1, 2008 and November 12, 2008. The FDEP anticipates adopting the new Rule in May 2009 with an effective date of July 2009.

As a firm that designs stormwater systems, CSI will be tracking the progress of the TAC's recommendations and readying ourselves for the rollout of the new Rule. Should you have questions, you may contact any of our offices.

Stormwater Quality Applicant's Handbook

The FDEP has prepared a draft Stormwater Quality Applicant's Handbook, dated March 5, 2008. The Handbook summarizes design requirements for stormwater quality treatment systems in Florida under the new Rule. This article references the March 2008 version of the Rule. It should be noted that the Handbook will be subject to change based on recommendations of the TAC, prior to its effective date, tentatively scheduled for July 2009.

So, what will be different under the new Rule? Presently each of the five Water Management Districts, except for Northwest Florida, set their own criteria for water quality standards. Under the new Rule, the water quality standards and design criteria will be consistently applied throughout the state, leveling the playing field. Second, the emphasis will be on nutrient loading in stormwater runoff, specifically targeting removal rates of phosphorus and nitrates. Stormwater systems designed under the new Rule will need to demonstrate that required removal efficiencies of these pollutants from the stormwater stream prior to discharge into surface waters and/or groundwater will be met.

The consideration of nutrient removal is not new to stormwater design and permitting in Florida. One example is the implementation of the Lake Apopka Basin Rule by the St. Johns River Water Management District in 2002. The Rule imposed more stringent requirements on stormwater treatment design of stormwater systems for new developments located within the Lake Apopka Basin watershed than other areas of the District. However, as previously stated, the new Statewide Stormwater Treatment Rule will generate a level playing field with a consistent standard throughout the state related to nutrient loading.

Best Management Practice (BMP) treatment trains may be required in many cases to achieve the required removal efficiencies. A treatment train is a number of BMPs placed in series that serve to improve pollutant removal. For example, the first "car" in the BMP series receives the highest pollutant load. The second receives a cleaner stream, and so on. This progression results in improved stormwater discharge quality. Although treatment trains have been encouraged under the current regulations, the proposed Handbook provides a mechanism to calculate the treatment credit associated with successive BMPs installed in series that was not recognized in the current regulations. The Handbook will establish a methodology to calculate the appropriate load reduction for such trains.

Stormwater recycling and reuse may become more commonplace to reduce stormwater discharge volumes and pollutant loads, especially when using wet detention systems. Tables will be provided in the Handbook that allow for calculating the amount of treatment credit to be allowed for water storage and irrigation rates.

Low Impact Design (LID) concepts are under development. Credits will be established to increase the focus on nonstructural, pollution prevention BMPs as the first "car" in the treatment train. Examples of LID concepts include:

- Green roof/cistern/irrigation systems
- Pervious concrete
- Florida Friendly Landscaping/Green Industry BMP Program
- Promotion of natural vegetation on-site to reduce compaction of urban soils/loss of infiltration capacity.

New Design Criteria

The March 2008 edition of the Handbook includes design criteria and the methodology for sizing stormwater quality components that meet nutrient removal rates required by the new Rule. Under the new Rule, post-development nutrient loading shall not exceed the pre-development nutrient loading. Runoff from undeveloped areas contains ambient levels of nitrates and phosphorus. Developed land areas typically generate higher concentrations of these nutrients. Therefore, stormwater treatment devices will be required to have sufficient nutrient removal capabilities to achieve pre- vs. post-development equality. The Handbook also provides tables for calculating pre-development and post-development nutrient loads.

The industry is already responding to new rule development by announcing software upgrades to take the treatment requirements into consideration in the design of stormwater treatment components.

Stormwater Treatment Components

Dry Ponds
Dry retention ponds (zero surface discharge) will remain the favored means of runoff volume attenuation and stormwater treatment in closed basins where the groundwater table and soil permeability will support such a system. Dry detention ponds that allow discharge are not recognized in the Handbook as a viable means of providing adequate treatment when also used for volume attenuation. The use of dry detention (pond or swale) for use as a BMP prior to discharge into a wet detention pond will be encouraged to provide pretreatment benefit.

Bio-filtration Systems
Bio-filtration systems consist of a dry basin underlain with perforated drainage pipe that collects and conveys stormwater following percolation from the basin through suitable soil. This type of system provides an alternative for site conditions where retention is not feasible because of low soil permeability rates, and where the site is not in a closed basin (i.e. a downstream receiving water is available for discharge). The underdrain discharge allows pond volume to recover in soils with low soil permeability rates. In effect, a bio-filtration system is a dry detention system that provides a higher level of treatment than a standard dry detention pond by using soil percolation prior to discharge via underdrain pipes.

Exfiltration Trench Systems
An exfiltration trench is a subsurface system consisting of a conduit such as perforated pipe surrounded by natural or artificial aggregate that temporarily stores and infiltrates stormwater runoff. The FDEP continues to recognize the use of alternatives to pipe and aggregate trenches, such as manufactured arch-shaped modular open-bottom chambers. There is little change in the design parameters of exfiltration systems in the new Rule, and their use continues to be encouraged due to their treatment and groundwater recharge capabilities. However, the operation of these systems remains a concern to the FDEP. Sediment accumulation and clogging by fines can reduce the life of an exfiltration system.

Wet Ponds

Wet detention systems are permanently wet ponds that are designed to slowly release collected stormwater runoff through an outlet structure. Wet detention systems have been widely used for decades throughout Florida and remain strongly recommended by the FDEP on sites where conditions favor their use (i.e. shallow groundwater). Presently, the design criteria for wet ponds vary widely between Water Management Districts. The new Rule will make uniform design criteria of maximum depth, mean depth, length to width ratio, littoral zone, and recovery time.

Other components discussed in the Handbook include the use of Wetlands Stormwater Management Systems, Vegetated Natural Buffers, and Stormwater Reuse Systems.

Stormwater credit categories have been developed to encourage preservation and design techniques that reduce the impact of developing sites (LID). Stormwater credit categories include the following LID techniques: natural area conservation, site reforestation, disconnection of impervious area, pervious pavement, and Florida Friendly Landscaping.

Redevelopment Sites

We saved the most controversial topic for last. A major issue that the TAC is addressing includes the definition of pre-development condition. Under the Rule as currently proposed, the pre-development condition will be defined as undeveloped native landscape, not the current land use of the developed condition. The nutrient loading under the pre-development condition will be compared with nutrient loading of the post-development condition in assessing removal efficiencies. This is a significant departure from the current requirements. Applying a definition of native landscape for the pre-development condition of developed sites will generally increase the amount of water quality treatment necessary to achieve the required removal efficiencies. This may make redevelopment of urban sites cost prohibitive to most owners and developers. Of course, reducing incentives to redevelop urbanized areas is not in the best interest of protecting natural environments throughout the state. Therefore, this is one of the priority issues for the TAC to address with the new Rule.

Summary

The proposed Statewide Stormwater Treatment Rule will have a noticeable impact on the design of stormwater systems and the cost of developing land in Florida. The new Rule will apply the same design standards throughout the state in lieu of each Water Management District setting unique stormwater treatment standards. The design standards will be based on nutrient loading; specifically phosphorus and nitrates. Dry detention ponds will not be recognized as a viable means of stormwater treatment. The TAC has advised that the new Rule should be more flexible with the definition of pre-development condition with respect to redevelopment of existing urbanized sites.

References

http://www.dep.state.fl.us/water/wetlands/erp/rules/sw_swt_rule_dvlpmt.htm

"Draft" Stormwater Quality Applicant's Handbook, prepared by the Florida Department of Environmental Protection, draft dated March 5, 2008

"Draft" White Paper – Proposed Statewide Stormwater Rule, March 3 Revision

Statewide Stormwater Treatment Rule Development, an issues presentation by Devo Seereeram, Ph.D., P.E., dated April 16, 2008

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