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February 25, 2010

Water Docket
U.S. Environmental Protection Agency
Mail code: 4203M
1200 Pennsylvania Ave., NW
Washington, DC 20460

Attention: Docket ID No. EPA-HQ-OW-2009-0817

Subject: National Association of Flood and Stormwater Management Agencies (NAFSMA) Stakeholder Input; Stormwater Management Including Discharges From New Development and Redevelopment

The National Association of Flood and Stormwater Management Agencies (NAFSMA) appreciates the opportunity to submit comments concerning the Environmental Protection Agency's (EPA) expressed intention to "initiate national rulemaking to establish a comprehensive program to reduce stormwater discharges from new development and redevelopment and make other regulatory improvements to strengthen its stormwater program".

NAFSMA is a 30 year old national organization based in our nation's capital that represents close to 100 local and state flood and stormwater management agencies. Its members serve a total of more than 76 million citizens by providing stormwater management or flood control services. Many of its members are currently Phase I or II jurisdictions falling under the Clean Water Act's (CWA) National Pollutant Discharge Elimination System (NPDES) Permit Program. The association on behalf of its members has a strong interest in the structure and administration of the nation's stormwater management programs.

Our comments, which include detailed and more broadly focused comments that reflect our serious concern with EPA's announced regulatory objective, are organized as follows: 1. **Summary**, 2. **Detailed Comments** responding to each of the topics for which input was requested, 3. **Conclusion**, and 4. **Appendix** on Summary of Responses about Local Conditions for Stormwater Management, and Technical Issues Related to a Uniform National Standards or Criteria.

NAFSMA reserves the right to submit future comments concerning EPA's proposed regulatory process, as determined necessary and appropriate.

SUMMARY

1. **CWA authorizes the regulation of pollutant discharges not flow:** The Clean Water Act is focused on the discharge and control of pollutants not the discharge of stormwater per se. The shift by EPA to begin regulating stormwater flow through the imposition of on-site controls results in the control of a land use activity, and land use control is beyond the authority of EPA. Also, the use of impervious area as a surrogate for flow, and flow as a surrogate for the discharge of pollutants, and the mandating of a prescribed stormwater flow control measure, i.e., on-site retention, is beyond the authority of EPA.

2. **Enhanced research effort and comprehensive evaluation required:** Current Phase II regulations state that after December 2012, EPA intends to conduct an enhanced research effort and compile a comprehensive evaluation of the NPDES Municipal Separate Stormwater System (MS4) program. Further, in the Phase II regulations as guidance EPA strongly recommends that until the evaluation of the stormwater program is accomplished, no additional requirements should be imposed on small MS4s without their agreement. The current rulemaking which is intended to result in new rulemaking being completed by December 2012 is in contradiction with existing regulations.

3. **National stormwater strategic initiative needed:** NAFSMA strongly urges the pursuit of a national stormwater strategic initiative that would involve engineers, scientists, regulators, MS4 administrators, and stormwater practitioners to evaluate the status of the stormwater sciences, sustainability and economic impacts on the MS4s and the country as a whole. This strategic initiative should include an EPA funded "NURP" type process to (1) determine the state of knowledge of stormwater management science and practices, (2) identify the known effective and sustainable technologies which can improve MS4 permit program performance, (3) identify a research and development agenda for the future, and (4) evaluate the cost and benefits of effective and economically sustainable technologies. Such a comprehensive effort would be consistent with the intent of current Phase II regulations.

4. **New regulation is not required to address the discharge of pollutants from construction sites, new development or redevelopment:** The Phase I regulation and Phase II regulation both address construction site runoff, and post-construction runoff from new development and redevelopment projects. Current regulatory authority should be fully used before promulgating a new regulatory program.

5. **Request in Notice for input on stormwater practices unreasonable:** The request in the Notice for stakeholder input on stormwater practices and considerations for modifying the existing regulations is unreasonable given the nature and extent of the specific information requested. NAFSMA continues its strong encouragement for EPA to undertake the stormwater science and engineering initiative summarized above to develop this type of information.

6. **Adequate authority exists to designate other MS4 sources of pollutants:** NAFSMA believes there is adequate authority in the existing Phase I and Phase II regulations to designate for regulation stormwater pollution sources outside of existing areas of defined coverage.

7. **NAFSMA supports existing authority to regulate pollutant discharges from construction and post-construction activity:** NAFSMA recognizes and supports EPA's existing authority and regulatory requirements for MS4's to include in their stormwater programs controls to address the discharge of pollutants from both the construction and post-construction phases of development activity.

8. **Federally mandated control practices inappropriate:** The future success of the stormwater NPDES program depends on the ability of each MS4 to select from among a variety of control practices those that most directly reflect local conditions and needs. Federally mandated control practices such as on-site

retention are not appropriate for all MS4s in the United States. However, these are land use and system design practices frequently used by NAFSMA members.

9. **Apply same structure of categorical measures in Phase II to Phase I MS4s:** NAFSMA believes that the clarity and administration of the stormwater regulatory program could be improved by applying to Phase I the same structure of categorical measures and toolbox approach provided in Phase II.

10. **Not clear EPA has authority to require MS4s to retrofit existing systems to control stormwater flow:** It is not clear that EPA has the authority to require MS4s to address stormwater discharges, as distinct from stormwater borne pollutants, in areas of existing development (retrofitting). Again, the CWA focuses on the discharge of pollutants and not the control of flow.

11. **Retrofit objectives not conducive to short term permit programs:** Retrofit objectives require long term strategies and comprehensive land use and infrastructure master planning and thus are not conducive to short term permit programs. The current Phase I and Phase II rules include retrofitting as a part of comprehensive master planning and address the retrofitting of flood management projects as part of the program's long term view. Retrofitting is most properly addressed through guidance as a component of the long term comprehensive master planning activities of the permittee relative to land use and infrastructure plan components

12. **Additional changes to regulation for sensitive areas not needed:** NAFSMA does not believe EPA should include in the stormwater NPDES permit additional changes to the regulations in sensitive areas such as requiring permits to include buffer areas. A federal requirement of buffer areas is a land use practice that is likely beyond EPA's authority absent evidence of a stormwater related discharge of pollutants.

DETAILED COMMENTS

General

1. The time period allocated by EPA for the assembly and submission of the types and volume of data required to address from a nationwide perspective the details of stormwater system design, operation, maintenance, performance, effectiveness, costs, benefits, liabilities and more, is inadequate. Also, the time allocated by EPA (now 21 months) to develop a new comprehensive stormwater program regulation is equally inadequate.

Some communities have been operating under stormwater NPDES permits for 20 years (others far less) and have submitted to the permit authorities volumes of data which has yet to be reviewed or analyzed. Further, there has been no comprehensive nationwide stormwater science and engineering initiative, upon which successful stormwater program advances could be based, since completion of Nationwide Urban Runoff Program (NURP) approximately thirty years ago. For EPA to suggest such data can be assembled within 60 days is not reasonable.

2. EPA appears to be violating both the provisions of 402 (p) and the existing stormwater Phase II regulations in order to pursue its stated regulatory objective.

- Section 122.37 of the Phase II regulation states (as regulatory language) that EPA will begin its evaluation of the Phase II program [(developed pursuant to Section 402(p) (5-6)] after December 10, 2012. This regulatory provision was produced in consultation with the Stormwater Phase II Federal Advisory Committee Act (FACA) committee in recognition of the need to undertake a "comprehensive evaluation", based on "an enhanced research effort" of the entire "NPDES MS4

storm water program” after the Phase I and Phase II programs had the opportunity to operate concurrently for a reasonable time.

This current regulatory initiative is clearly inconsistent with the existing regulatory language and the commitment to the FACA process which produced it.

- Section 122.34(e)(2), presented as guidance, advises the permit authorities not to alter the stormwater program requirements until the Section 122.37 evaluation is accomplished. The process, scope and timing of the currently proposed regulatory revision, require it to be undertaken without the satisfaction of Section 122.37 and 122.34. NAFSMA strongly recommends EPA reconsider its announced process and timeline in light of the well thought out approach in the existing regulations.
- EPA states in this current notice [at Section II Background, Statutory and Regulatory Overview (FR p. 68619)], that EPA “is (present tense) authorized to designate additional stormwater discharges - - -” pursuant to Section 402(p)(6). However, the 402(p)(5-6) authority granted by the Congress was a singular, as opposed to an open ended, authority which was exercised by EPA with the report to the Congress which produced the Phase II regulation.

There is no authorization evident in 402(p) for a phase beyond Phase II which satisfied the original congressional directive. NAFSMA, therefore, believes new law is likely necessary for EPA to pursue the new regulatory scope addressed in its December 28, 2009, notice.

- In establishing such a short time frame for stakeholders to comment on EPA’s announced process and intent to reconstruct such a complex regulatory structure in such a short period, without benefit of adequate scientific, engineering, environmental and economic data, EPA appears to be rushing toward the type of hasty decision making it advised against in the existing regulatory program.

3. EPA, in its December 28, 2009, notice, places heavy emphasis on its desire to establish “a comprehensive program to reduce stormwater discharge from new development and redevelopment”. NAFSMA believes this stated intent is inconsistent with EPA’s NPDES authority under the Clean Water Act and ignores existing regulatory provisions already established in the Phase I and Phase II programs.

- EPA’s Clean Water Act NPDES authority is focused on the discharge of pollutants to waters of the United States; not, as EPA states in its notice, the reduction of stormwater discharges from new development or redevelopment. NAFSMA believes new law is required if EPA is to extend NPDES regulatory authority to the design of local land use inherent in mandating the reduction of site runoff. (See discussion in General Comments No. 5)
- The November, 1990, Phase I regulation requires the permittees to develop a “comprehensive master plan to --- reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment.” Also, the Phase I regulations require that MS4 controls “reduce pollutants in discharges from municipal separate storm sewers after construction is completed”. These Phase I provisions are consistent with the provisions of the Phase II regulations which address construction site runoff, and post-construction runoff from “new development and redevelopment projects” pursuant to Section 122.34 which requires these measures and others “to reduce the discharge of pollutants from your MS4 to the maximum extent practical ---.”

In view of these existing regulatory provisions NAFSMA does not believe a new regulation is required to address the discharge of pollutants from construction sites, new development or redevelopment.

4. The proposed new stormwater regulation initiative addressed by the Information Collection Request (ICR) and the December 28, 2009, Stakeholder Input notices appear to be at variance with Administrator Jackson's memorandum of January 23, 2009. In that memo the Administrator stated, "Science must be the backbone of EPA programs. ---policy decisions should not be disguised as scientific findings. I pledge that I will not compromise the integrity of EPA experts in order to advance a preference for a particular regulatory outcome."

The October, 2008, report of the National Research Council of the National Academy of Sciences on Urban Stormwater Management in the United States documents the lack of adequate science relative to the stormwater regulatory program, citing the "paucity of data", and stating, "the science of stormwater is not sufficiently far advanced to determine causality between all sources, resulting stressors, and their chemical and biological responses."; and, "Thus, it is not yet possible to create a protocol that mechanistically links stormwater discharges to the quality of the receiving water."

Of significance is the fact that the Report's presentation of "Stormwater Management Approaches" (Chapter 5) includes among its seven conclusions and recommendations, two citing the need for fundamental research, and a third citing the need for advances in the development of guidance for the selection design, operation and maintenance of stormwater controls.

NAFSMA believes EPA's current stormwater regulatory rulemaking initiative is advancing a preferred regulatory approach in lieu of securing the science and engineering required to insure maximum program effectiveness under the law.

5. The form and reach of the regulations proposed by EPA in its December 28, 2009, Notice for Stakeholder Input require the exercise of federal authority over state and local land use policy for the singular purpose of stormwater control. However, state and local land use policy, ordinances and codes, address the balanced consideration of multiple public purposes (health, safety, transportation, recreation, education, environmental, economic and more). Such federal intrusion will create conflicts among such state and local plans and policies and could potentially lead to specific state and local land use designations by federal agencies.

Equally important, the constitutional protection of state and local authorities cannot be abridged by EPA as a means to address complexities and questions about effectiveness in the NPDES stormwater program. EPA acknowledged that federal land use control exceeds constitutional authority in the preamble to the Phase II regulations. Specifically, EPA said they recognize "that land use planning is within the authority of local governments. EPA disagrees, however, with the implication that today's rule dictates any such land use decisions....The rule provides the MS4 operator with flexibility to determine the appropriate BMPs to address local water quality concerns. EPA recognizes that these program goals may not be applied to every site, and expects that MS4s will develop an appropriate combination of BMPs to be applied on a site-by-site, regional or watershed basis."

In response to the recommendations in the National Research Council (NRC) report, the EPA Office of Water Administrator Ben Grumbles said in October, 2008, that EPA has, "already been pushing the envelope of its authorities" for regulating stormwater and has stretched the limit of its authority under current law. He added that the "controversial" proposals in the NRC report will require "Congress to buy in" and a "partnership between states, localities," and EPA.

The 1987 Clean Water Act amendments were crafted so as to create such a federal, state and local partnership within the framework of the constitutional separation of powers. NAFSMA strongly encourages EPA to continue to honor that legislative framework.

6. The economic impact evaluation of the intended rulemaking appears to have received inadequate attention by EPA. The economic impacts of the proposed rule on states, MS4s and industry must be undertaken prior to the implementation of a new nationwide stormwater rule.

- Available data indicates the cost to implement Low Impact Design (LID) practices is higher than the cost to implement standard practices; and, in some studies (Tetra Tech, Inc., September, 2005) LIDs are found to be no more effective at achieving certain in-stream goals than the less expensive practices.
- Increased on-site mandates increase the cost of housing, businesses and public services.
- In Maryland some local officials are expressing concern that the high cost of the new stormwater rules could actually create more urban sprawl by deterring infill and redevelopment (The Baltimore Sun, January 19, 2010).
- The impact of current economic conditions has caused all but two states to make significant cuts in environmental regulatory programs (USA Today, February 3, 2010).

Local communities and stormwater practitioners understand the immense cost and economic impact associated with EPA's proposed rulemaking. EPA must understand and weigh this impact before promulgating the proposed rule.

7. NAFSMA is concerned that EPA in its consideration of the NRC Report on Urban Stormwater Management in the United States has selectively excluded consideration of some of the Report's key findings.

- “---the implementation of Stormwater Control Measures (SCM) at the watershed scale has been too inconsistent and too recent to definitively link their performance to the prolonged sustainment - at the watershed level --of receiving water quality, in-stream habitat, or stream geomorphology.”
- “Stormwater cannot be adequately managed on a piecemeal basis due to the complexity of both the hydrologic and pollutant processes and their effect on habitat and stream quality.”
- “Publicly owned, consolidated SCMs should be strongly considered as there may be insufficient land to have small on-site systems.”
- “As a first step to taking the proposed program nationwide, a pilot program is recommended that will allow EPA to work through some of the more predictable impediments ---.”
- “The federal government should provide more financial support to state and local efforts to regulate stormwater.”
- The NRC Report recognized the dilemma created by the archaic designation of beneficial uses and discussed the need to remedy this problem (through tiered uses) as part of a comprehensive stormwater program.

- EPA should engage in much more vigilant regulatory oversight in the licensing of products that contributes to stormwater pollution.

NAFSMA is concerned that EPA appears to have cited only those parts of the NRC Report which conform to its preferred course, and ignored those that reflect the monumental complexity of stormwater management. In doing so, it is not giving full weight to the science on hand that illuminates the science needed.

8. NAFSMA is concerned that the substantial inconsistency which exists within some states and across the nation in implementation of the existing stormwater regulator program is not given adequate weight in judging the need for new regulations. Inconsistency in monitoring, analytic protocols, designation of areas for permit coverage, funding of effort, inspection and enforcement, selection and application of SCMs, operation and maintenance, and performance assessment and evaluations cause the current regulations to be judged effective in some locales and inadequate in others.

Interestingly, as Phase I permits have grown increasingly prescriptive, they have at the same time grown increasingly inconsistent in focus and approach.

NAFSMA believes it is not the current regulations which are inadequate, but rather it is the inconsistency of program administration that is the principal inadequacy. This problem will not be remedied by the proposed new regulations.

9. EPA must take the initiative to substantially advance the stormwater science and engineering required to facilitate successful sustainable stormwater management.

- LIDs and green infrastructure design principals must be developed to function within various local conditions and climates.
- Maintenance protocols must be determined that are practical and affordable (no SCM is sustainable without effective dependable maintenance).
- Policy questions must be addressed on the basis of sound complete information, not just on selective pieces of data in hand.
- EPA must evaluate and apply the lessons learned from the many community programs already implementing stringent stormwater programs.
- The science behind retention practices in general is still in its infancy.
- Implementation of a new nationwide rule is likely to be hindered by a lack of expertise and understanding of effective stormwater system design and operation principals.
- The NRC Report states, "Performance characteristics are starting to be established for most structural SCMs, but additional research is needed on relevant hydrologic and water quality processes ---."
- Poorly designed and/or operated SCMs become a public nuisance, a safety hazard, a maintenance burden, and often an environmental liability.

NAFSMA firmly believes that the successful attainment of stormwater program objectives is wholly dependent on the quality of the science, technology and engineering upon which it is based.

10. Site specific conditions are the critical determinant of stormwater system design and operation. The tremendous variance in critical design factors, even across local watersheds (and even more so within states and across the nation), render nationwide standards problematic and non-functional.

- In California, the widespread imposition of Standard Urban Stormwater Mitigation Plans (SUSMP) resulted in limited inconsistent stormwater treatment, even though all were sized to the design water quality storm.
- The increasing role of Total Maximum Daily Loads (TMDL) in addressing stormwater pollutants requires recognition of many of the site specific conditions which influence the quality and health of the receiving water.
- The viability of retrofitting as an SCM strategy requires recognition of site specific physical, economic and environmental factors.
- Ohio relied on on-site specific conditions to create additional requirements to preserve two of the state's most pristine rivers.
- Preferred LID treatment requirements of the San Francisco Bay Area Municipal Regional Permit cannot be implemented on all sites in the Santa Clara County program because of a predominance of clay soils and high groundwater; and, harvest and reuse is limited by rainfall patterns, code restrictions and competition with recycled water supplies.
- In arid regions on-site retention practices can eliminate or dangerously reduce in-stream flows and habitat.
- In some western states water rights law may be in conflict with on-site retention requirements.

NAFSMA believes EPA must establish a range of requirements within which states and localities can design programs to meet local needs and conditions.

11. NAFSMA believes that the continually expanding experience with the stormwater regulatory program reaffirms the absolute correctness of, and necessity of maintaining the MEP standard.

- It is the law. Absent changes in the Clean Water Act to the contrary, the MS4 permit performance standard continues to be the Maximum Extent Practicable (MEP) standard set forth in Section 402(p).
- It is the only permit program standard that allows for the recognition of the immense array of variables and site specific climatological, hydrologic, topographic, geologic, economic, environmental, historical and developmental factors which influence stormwater and its regulation.
- The application and pursuit of the MEP standard is the only permit program objective which continually advances the science, technology and engineering of stormwater management systems.

NAFSMA believes that the factual record demonstrates that movement away from the MEP standard toward prescriptive nationwide requirements, diminishes the desired results, increases costs and directs the program's energy toward unproductive legalism and litigation.

Comments Addressing Specific Requests for Stakeholder Input

NAFSMA members from across the country have expressed serious concerns as to this section of the request for Stakeholder Input. While NAFSMA has continually urged EPA to pursue the science, technology and engineering data which is essential to the effective administration of the stormwater management program, the data requested as "Additional input" simply is not available in the volume, form, vetted accuracy or applicability to support a nationwide rulemaking; nor can it be made available in such a limited time period. Comments specific to each of the four questions are presented below.

A. Additional Input Regarding Stormwater Control Practices.

1. Information as to the design, performance, operation and maintenance, capital and life-time costs, and environmental and economic benefit information concerning the on-site (parcel-by-

parcel) retention of stormwater; specifically where such practices have been used in retrofitting previous development as greenfields.

NAFSMA is first concerned with the very narrow focus of this request, particularly so in view of the National Research Council's finding concerning the significant lack of adequate data and science concerning the mechanistic links between stormwater discharges, stormwater management controls, and receiving water quality. Available data will, at best, be site specific and anecdotal and inadequate to support nationwide requirements. Such information could, however give insight into the shaping and direction of a stormwater research initiative such as that suggested by NAFSMA in its response to the NRC report.

Secondly, NAFSMA is concerned that this request by EPA gives evidence of a lack of understanding at EPA of the impact of site specific conditions on the design of local stormwater systems. Precipitation form and patterns, surface slope, soil types, groundwater conditions and available open space are determinant on-site factors affecting retention which can vary dramatically from community to community.

A few examples are provided below to illustrate the variability of site specific conditions across the United States. In these examples the annual rainfall varies from 4.2 inches to over 50 inches; the area unsuitable to retain and infiltrate varies from 10% to 100%; and water rights is an issue in some states but not others.

- Harris County, Texas:
 - Annual rainfall over 50 inches.
 - About 95% of the area is unsuitable to retain and infiltrate stormwater runoff because of low permeability, highly erosive soils, high groundwater, and high rainfall amounts with easily saturated soils.

- Bellevue, Washington:
 - Annual rainfall of 35 inches.
 - About 35% of the area is unsuitable to retain and infiltrate stormwater runoff because of steep slopes/gradients, low permeability soils, shallow bedrock, high groundwater and groundwater contamination.
 - Washington does not allow rainwater harvesting except for individual single family homes because it is a water right issue.
 - Stormwater retention and harvesting affects stream base flows because of the diversion of stormwater away from local streams.

- Las Vegas, Nevada:
 - Annual rainfall of 4.2 inches
 - About 100% of the area is unsuitable to retain and infiltrate stormwater runoff because of steep slopes/gradients, low permeability soils, shallow bedrock, high groundwater, highly erosive soils, expansive and collapsible soils, and groundwater contamination.
 - Low annual rainfall; high Total Dissolved Solids (TDS) levels in the shallow ground water aquifer with naturally occurring selenium; and high sediment loads from undeveloped land because of minimal vegetation cover, erosive soils and highly shifting natural channels are of particular concern.

- Washington, D.C.:
 - Annual rainfall of 40 inches.

- About 10% of the area is unsuitable to retain and infiltrate stormwater runoff because of steep slopes, low permeability soils, and high ground water.
- Los Angeles, CA
 - Annual rainfall of 15 inches.
 - About 48% of the area is unsuitable to retain and infiltrate stormwater runoff because of low permeability soils.
 - The right to use/reuse waters may require consent of Watermaster because of water right issues.

NAFSMA continues its strong encouragement for EPA to undertake the stormwater science and engineering initiative set forth in our August, 2009 comments on the NRC Report on Urban Stormwater Management in the United States.

2. Cost Comparisons of different stormwater management approaches for specific sites.

EPA is specifically requesting cost comparisons between “traditional” stormwater conveyance and disposal systems with systems that rely on on-site retention.

Given the diverse nature of stormwater program accounting from community to community, and the significant variance regarding who pays such costs and when, and whether they are recorded as stormwater program costs, data submitted pursuant to this request will have little value as support for the proposed nationwide rulemaking.

In Fresno, California, which is served by a regional retention system, multiple site specific comparisons over many years affirmed that on-site retention was more expensive and less reliable than the off-site public system. The reader is also referred to the September, 2005, work by Tetra Tech, Inc. for Charlotte, North Carolina, which documented LID costs higher than standard practices.

3. Design, performance, operation and maintenance, capital lifetime costs, and environmental and economic benefit information for retrofitting separate from redevelopment.

The factors which complicate the comparison requested by questions numbered 1 and 2 above are further complicated in this request relative to retrofitting. Costs and impacts not otherwise found in stormwater systems, such as acquisition of developed land, occupant and use relocation, major demolition, soil contaminant studies and remedies, alteration of public utilities, and service and transportation systems become significant considerations. The plausibility of stormwater control through retrofit, therefore, becomes even more site specific than either traditional or on-site retention based systems

Retrofit approaches are addressed in the current regulations as a potential component of the stormwater management tool box. NAFSMA knows of no evidence which would support changing this status.

4. Monitoring information that may show the impacts of stormwater control measures on water quality or flow rates in receiving water.

Over the twenty years of the NPDES stormwater program much data has been collected through permit monitoring requirements, grant funded research, the TMDL program, regional monitoring coalitions, and other related sources.

Because of the variant character of stormwater and stormwater related pollutants, the NRC report concluded “---additional research is needed on the relevant hydrologic and water quality processes within SCMs across different climates and soil conditions.”, and “Research is needed to determine the effectiveness of suites of SCMs at the watershed scale”. In short, NRC concluded there is a tremendous amount of data, but it is inadequate to demonstrate the cause and effect linkage between stormwater, stormwater borne pollutants, control measures and in-stream water quality and health.

EPA is, in essence, asking for the re-submittal of data already known to be inadequate. NAFSMA reaffirms its recommendation for the nationwide stormwater science initiative previously described.

B. Preliminary Consideration for Modifying/Supplementing EPA’s Stormwater Regulations

1. Expand the area subject to federal stormwater regulations:

- **how should EPA identify appropriate boundaries for permit coverage?**
- **how can EPA identify areas that should be covered?**
- **should EPA consider regulating stormwater discharges from particular types and sizes of development?**

As stated in our preceding comments, NAFSMA does not believe EPA has available to it Clean Water Act authority for a Phase III stormwater program. NAFSMA does believe, however, that EPA has authority in the Phase I and Phase II programs to designate for permit coverage any source of stormwater borne pollutants being discharged to a water of the United States.

- Phase I at Section 122.26(a)(1)(v) allows designation by the State or EPA for “A discharge which the Director or --- Administrator determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States
- Phase I at Section 122.26(a)(3)(ii) allows discretion to issue one system-wide permit or distinct permits for appropriate categories of discharges within a MS4 system, including all discharges owned or operated by the same municipality, all discharges located in the same jurisdiction, all discharges within a system that discharge to the same watershed, etc.
- Phase II regulations at Section 122.26(a)(9)(i)(D) allows designation by EPA or the state if it is determined “that the discharge, or category of discharges within a geographic area, contributes to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States.”
- Phase II regulations at Section 123.35(b) provide that the permitting authority may designate MS4s that are outside an urbanized area as regulated MS4s, based on “whether a stormwater discharge has the potential to result in exceedances of water quality standards, including impairment of designated uses, or other significant water quality impacts, including habitat and biological impacts.” The “guidance” to that section recommends that such designation be based on a balanced consideration “on a watershed or other local basis”: discharge to sensitive waters, high growth or growth potential, high population density, contiguity to an urbanized area, significant contributor of pollutants to waters of the United States, “, etc.

Also, pursuant to Section 122.35 of the Phase II regulation, a designated site may contract with a permitted MS4 to perform the appropriate stormwater pollution controls to address the pollutant discharge of concern.

Since this authority already exists under the present rules, and is based on a decision by local permit authorities relating to local water quality impacts, it is unnecessary and inappropriate to expand the area subject to federal regulation by an inflexible national rule.

Clearly, EPA (and the states) have current authority to bring under permit coverage any site where the discharge of pollutants causes or contributes to a water quality violation of a jurisdictional water. Various states have actually used this authority. In California the state's regulatory bodies have utilized the Construction General Permit to insure coverage of outlying development. Vermont has designated certain rural areas for inclusion, and Ohio has designated its rapidly growing areas. NAFSMA supports appropriate permit coverage of documented sources of MS4 stormwater pollutants.

NAFSMA believes that part of EPA's perceived problem could be remedied by amending Section 122.32(a)(1) such that the entire MS4 must be covered by its NPDES permit program if any part of the MS4 is within an urbanized area. This would eliminate the cases where part of the community (most likely, its existing development) is covered by permit while its undeveloped area (most likely, its potential growth area) is not covered.

2. Establish specific requirements to control stormwater discharges from new development and redevelopment.

- **what standards would promote sustainable practices that mimic the natural processes of infiltration, evapo-transpiration and reuse; (on-site retention to mimic predevelopment hydrology; on-site retention of a design storm event; limitation of impervious area; local/regional research and standards)?**

As stated in our preceding comments, NAFSMA does not believe EPA has the authority under present law to regulate "stormwater discharges from new development and redevelopment". However, NAFSMA recognizes and supports EPA's existing authority and regulatory requirements for MS4s to include in their stormwater permit programs controls to address the discharge of pollutants from both the construction and post-construction phases of development activity.

NAFSMA recognizes the usefulness of on-site retention design features which can approximate pre-development hydrology, maximize green space and contribute to the public's protection from storm related runoff. These are land use and system design practices used regularly by NAFSMA members across the country. They are design approaches which take consideration of and reflect the site specific conditions within which the community is located.

The current regulations require each permitted MS4 to consider these and other practices in assembling a local stormwater permit program that fits the local conditions. NAFSMA believes the future success of the stormwater NPDES program is dependent on the ability of the local MS4s to select from among a variety of control practices those that most directly match the local conditions and need.

The Phase II rules were the product of negotiated rulemaking in the Stormwater Phase II FACA subcommittee, and one of the overriding themes of the final regulations was to provide maximum flexibility to the permitting authority to structure their permits and the scope of their programs in accordance with local conditions. Those program design considerations include the need to consider stormwater in the context of broader issues such as flood control, water supply, water quality, affordable housing, urban design, and more.

In considering the possibility of creating a regulatory mandate and standards for on-site retention, an array of issues are created which will dramatically change the legal, administrative and operational function of the stormwater control program. Mandated on-site retention controls would be part of the public regulatory compliance system but would be located on private property. Complications of the “public facility” located on private property and owned by private parties gives rise to serious and complex questions, including:

- the right (or not) of public access on the private property;
- the responsibility for, and right to operate, maintain, restore or modify the on-site features;
- the responsibility to pay the cost of constructing, operating, maintaining, etc., the on-site control features;
- the liability arising from the presence, operation, or failure of the control features;
- the exposure to penalties imposed on the MS4 for a permit violation; and more.

These represent program complications arising from EPA’s proposal that substantially limit the potential benefit from a nationwide on-site retention mandate. Also, paragraph No. 10 of the preceding General Comments addresses limiting site specific factors.

NAFSMA strongly supports the toolbox approach to stormwater pollution control. Local conditions vary considerably across the United States and individual MS4s must have the flexibility to select those structural and nonstructural management tools that work best for their hydrologic, geologic, climatic, soil, and topographic conditions. As evidence of this, there is data to suggest that mandated retention practices are not required in Charlotte, North Carolina, to meet certain water quality standards.

NAFSMA conducted an informal survey of a number of MS4s across the United States to explore and document the diversity of conditions that each MS4 has to consider in designing effective stormwater pollution reduction programs. The “Questionnaire About Local Conditions for SW Management” was developed by NAFSMA for that purpose. Responses were received from 29 MS4 communities spanning most regions of the country.

NAFSMA also prepared a summary technical analysis of the hydrologic diversity across the United States; a summary of Best Management Practices (BMP) whole-life cycle investigations in the Denver region; findings on the effectiveness of extended detention basins in controlling geomorphic impacts; and, a summary analysis of the above mentioned questionnaire responses, see Appendix. The questionnaires and the report clearly demonstrate the diversity of conditions across the contiguous United States, demonstrating that flexibility allowing local jurisdictions to develop their local stormwater management programs is critical, and demonstrate why it is impractical to mandate specific measures in federal rulemaking.

NAFSMA submits its summary analysis and questionnaire results to demonstrate the site specific factors which so directly impact the stormwater management program structure. Further, NAFSMA emphasizes again, that whatever the form of the final rule, the CWA performance standard for MS4s is that “Permits for discharges from municipal storm sewers ... shall require controls to reduce the discharge of pollutants to the maximum extent practicable...”, emphasis added, Section 402(p)(3)(b)(iii).

3. Develop a single set of consistent requirements for Phase I and Phase II MS4's.

Communities permitted under the Phase I rule do not have quite the same freedom to design a stormwater control program which is weighted to the specific needs and conditions in their community, as do the Phase II permittees. While EPA considers the Phase I regulation as primarily one of application requirements, it in fact contains at least eighteen very specific program performance requirements. By contrast, Phase II establishes six categories of management practices which must be incorporated into each MS4 permit program.

Contrary to the NRC assertion that permittees are allowed to establish their own performance standards, they are required in fact by law to meet the standard created by 402(p). However, they are allowed under the Phase II rule to select the combination of stormwater control practices which will insure that the 402(p) standard is attained in their community.

NAFSMA believes that the clarity and administration of the stormwater regulatory program could be improved by applying to Phase I the same "tool box" structure of categorical measures provided in Phase II. However, in unifying the Phase I and II program structures, an overarching framework of goals should be established which then leaves flexibility for implementation by the individual permittees. Further, this unified structure should be technically and economically feasible to implement and be focused on the MEP standard.

NAFSMA has seen no evidence to date that suggests that the six categories of control measures set forth in the Phase II are inadequate to address the full array of municipal stormwater pollutant sources, with the exception of pollutant source control needs requiring the authority and action of state and federal agencies (i.e. the licensing of products that are considered pollutants when found in stormwater).

Such a unified structure might also give consideration to non-traditional MS4s which tend to have different legal and operating protocols than traditional MS4s. In addition, certain existing Phase I requirements, such as monitoring and industrial permit oversight, should be moderated relative to Phase II MS4s. Further, there may be value in a separate permit structure for transportation systems.

In considering the issues of responsibility for the implementation of practices that achieve Clean Water Act objectives, EPA must not simply assume that imposing more performance obligations on local permittees will produce more in-stream benefits. Neither should it assume that the transfer of state and federal program responsibilities on to the local permittees will do anything other than further diminish the permittee's ability to implement effective stormwater programs.

Though not currently widely supported, the possibility of moving the industrial site permit program into the MS4 permit program may be of sufficient potential value to warrant an in depth discussion among the permitting authorities, the permittees and industry representatives. Such discussions must also consider the need to transfer resources to the permittee in addition to the potential added responsibilities.

4. Require MS4s to address stormwater discharges in areas of existing development through retrofitting the sewer system or drainage area with improved stormwater control measures.

Many of the broad impacts and issues associated with a mandatory retrofit requirement have been touched on in the preceding comments and include some of the following:

- it is not clear EPA has authority to impose such requirement;

- substantial new legal, financial and operational issues are associated with a retrofit program;
- absent development or redevelopment projects there is rarely an event which gives a local agency opportunity or legal standing to initiate significant land use or infrastructure retrofits;
- retrofit objectives typically require long term strategies and comprehensive land use and infrastructure master planning, and are thus not conducive to short term permit program mandates.

The development of the Phase I rule was cognizant of the need to address broad area wide stormwater pollution control strategies over the long term and addressed that fact in the description of the proposed management program at Section 122.26(d)(2)(iv)(A)(2) [a comprehensive master plan to reduce discharge of pollutants]. Both the Phase I rule [122.26(d)(2)(iv)(A)(4)] and the Phase II rule [122.34(b)(6)(ii)] address the retrofitting of flood management projects as part of the program's long term view.

Because of factors addressed previously, retrofitting is typically very costly, and results are highly variable. The need for and value of retrofits is of necessity a site specific system design issue best addressed through local stormwater management master planning and/or TMDL response planning, taking into consideration the pollutants which might be controlled, the cost, the effectiveness of alternative SCMs and the long term usefulness of the retrofit.

The substantial cost and effort associated with retrofits make this form of SCM an appropriate focus of incentive programs (off-setting performance modifications, grants, etc.). Care should be taken not to construct significant retrofit SCMs for the control of pollutants which in the long term will be effectively controlled through more adaptable measures.

NAFSMA believes the matter of retrofitting is most properly addressed, through guidance, as a component of the long term comprehensive master planning activities of the permittee relative to land use and infrastructure plan components.

5. Should EPA include additional changes to the stormwater regulations in sensitive areas such as requiring buffer areas?

With respect to EPA's specific suggestion of requiring buffer zones as permit conditions, NAFSMA believes that there is no authority to support such a requirement. Imposing a mandatory land use practice to preclude the possibility of a potential and currently nonexistent future discharge is beyond EPA's authority to regulate the actual discharge of pollutants.

Buffers are currently an option within the toolbox of stormwater management measures available to MS4s. EPA through guidance could encourage their use in sensitive areas, see Section 123.35(b) guidance.

Substantial concern has been expressed as to lack of a means of defining "sensitive areas" in a way relevant to the community in which they are located. Because that which is considered sensitive in Phoenix most likely differs substantially from that which is considered sensitive in Seattle, a nationwide standard would be ineffectual if not the cause of negative unintended consequences.

The identification of sensitive areas and the development of protective strategies must therefore be a local decision. The stormwater program requirements should require MS4s to understand their pollutant discharge impacts on the receiving waters and address those impacts through appropriate, locally determined SCMs and mitigations. Ohio's multi-tiered beneficial use designation system gives evidence of such local determination and action.

There are, however, several actions which could significantly improve program administration and performance. A few of these are listed below and NAFSMA is prepared to discuss these and others at EPA's convenience.

- uniform nationwide implementation and enforcement of the existing regulations.
- properly resource the state and federal 402(p) program responsibilities.
- substantially advance stormwater science and engineering.
- focus attention on defining clear performance expectations rather than just prescribing specific activities.
- develop a uniform assessment evaluation model.
- create uniform data formatting and analytical methodologies (i.e., NURP).
- use permit authority staff time to evaluate performance rather than attempt to design and write prescriptive local permit stormwater control measures.
- focus monitoring on the pollutants and receiving waters of concern.
- consider tiered beneficial use designations (i.e., NRC report).
- create uniform categories of control practices for both Phases I and II.
- create active state and federal initiatives directed toward source control of pollutants allowed under state and federal authorities.
- if part of an MS4 is in an urbanized area, require the entire MS4 to be covered by the permit.
- do not try to solve the problem of inadequate state and federal resources by increasing the performance mandate on the local permittee.
- continue Maximum Extent Practicable as the basic performance requirement for the discharge of pollutants in stormwater.
- continue and improve the "tool box" approach to constructing local stormwater control programs.

CONCLUSION

As a result of the NURP program, the nation knew of the variant character of stormwater and of stormwater borne pollutants. As a result EPA, the nation's stormwater practitioners, and the Congress knew stormwater quality management required a non-numeric effluent limit/programmatic approach to the stormwater quality control effort.

This knowledge shaped the drafting of Section 402(p) and the subsequent Phase I and II regulations and the early MS4 permits. The full complexity of stormwater and the related difficulty of proving receiving water results have grown more apparent since the stormwater permit program first began 20 years ago. Unfortunately, the regulatory entities have begun to abandon the long term strategies the stormwater program requires in favor of prematurely advancing the rulemaking process ahead of the schedule set forth in existing Phase II regulations.

NAFSMA shares EPA's goal of improving stormwater quality, but believes implementation of the type of regulations proposed by EPA could have serious negative environmental and economic impacts if not given thorough consideration. NAFSMA also believes, however, that the original Phase I and Phase II regulatory program can be improved consistent with the character of stormwater and the capabilities of local permitted agencies. We look forward to working with EPA toward that goal.

Sincerely,



Gale William Fraser, II, PE
NAFSMA President

APPENDIX

Summary of Responses about Local Conditions for SW Management and Technical Issues Related to a Uniform National Standards or Criteria

February 25, 2010

SUMMARY OF QUESTIONNAIRE RESPONSES

NAFSMA conducted an informal survey of a number MS4s across the United States to explore the diversity of conditions that each have to operate under. A total of 29 responses were received, with 19 coming from California and 10 from other States. The responses came from:

Artesia, CA; Dowdy, CA; City of Los Angeles, CA; Los Angeles County, CA; El Monte, CA; Hermosa, CA; Huntington Beach, CA; Bradbury, CA; City of Commerce, CA; Beverly Hills, CA; Carson, CA; Rolling Hills, CA; Manhattan Beach, CA; Vernon, CA; San Dimas, CA; Santa Monica, CA; West Covina, CA; Malibu, CA; Bellevue, WA; Denver, CO; Chicago, IL; Charlotte, NC; Knoxville, TN; Maricopa County, AZ; Washington, DC; Rockville, MD; Las Vegas, NV; and Harris County, TX.

What follows is a summary of its findings. What clearly emerges from looking at the responses is that these municipalities are committed to making the current regulatory stormwater programs work and continue to expend their limited and strained local resources to make that happen.

The diversity in precipitation types among the 29 respondents was quite significant.

Rainfall patterns across the United States vary considerably and the responses verify this, although most of the responders were from temperate or warm climate zones and only few from colder regions. The respondents reported that they experience the following rainfall/precipitation patterns:

- 30% experience random rainfalls only that occur during the entire year
- 20% have regular ice or snowfall during the year
- 30% have distinct rainfall and snowfall seasons
- 20% have a distinct and prolonged dry season followed by relatively short rainfall season
- 30% experience uniform low intensity rainfalls of long duration
- 80% experience high intensity short duration rainstorms
- 70% have a mix of thunderstorms and low intensity prolonged rains
- Annual precipitations depths varied from 4.2 inches to 50 inches.

There are significant variations across United States in how MS4s are required to size their stormwater quality control facilities.

- About 2/3 of them follow requirements or recommendations to size their detention and/or retention basins on the basis of specified depth of post developed runoff.
- 55% have to do that using specified rainfall depth.
- About 24% have to address other methods.

The above percentages add up to more than 100% because some of the respondents detain/retain a specified rainfall depth, a specified runoff depth, and/or a specified percentile runoff/rainfall event.

There is much diversity in the BMPs that the respondents are using and have developed standards for their use.

In California the BMP uses are as follows:

- 42% use *Extended Detention Basins* (Dry) serving more than individual lots

- 16% use *Wet Ponds* serving more than individual lots
- 95% use *Surface Media Filters*
- 63% use on-site *Rain Gardens/Bio-Retention Cells*
- 89% use *other on-site LID practices* like grass swales, grass buffers, etc.
- 16% use *Wetland Basins*
- 53% use *Underground Media Filters*
- 32% use *Underground Hydrodynamic Devices*
- 11% use other BMPs, including *Permeable Pavements, Underground Vaults, and others.*

In the other states, excluding California, the BMP uses by MS4 are as follows:

- 100% use *Extended Detention Basins (Dry)* serving more than individual lots
- 80% use *Wet Ponds* serving more than individual lots
- 70% use *Surface Media Filters*
- 80% on-site *Rain Gardens/Bio-Retention Cells*
- 80% use *other on-site LID practices* like grass swales, grass buffers, etc.
- 60% use *Wetland Basins*
- 80% use *Underground Media Filters*
- 60% use *Underground hydrodynamic devices*
- 70% use other BMPs, including *Permeable Pavements, Underground Vaults, and others.*

When asked if the MS4 requires on-site stormwater RETENTION and disposal/infiltration of runoff, the responses were as follows:

In California:

- 47% require retention, infiltration. But, when asked of those that are using retention and infiltration if these practices are successful, only 11% believe they are successful in all cases and 89% think they are successful in most cases.
- 56% return the infiltrated water to the surface via underdrains.
- 37% of all respondents said their soil, groundwater or geology hinder/preclude infiltration
- The runoff/storm event percentiles being captured by retention basins was between 80% and 85%.

In the other states, excluding California:

- 20% require retention, infiltration. But, when asked if these practices are successful, the two respondents that use retention/infiltration did not think they operated successfully in all cases, but did so in most cases.
- Both respondents had to return the infiltrated water to the surface via underdrains.
- 50% of all respondents said their soil, groundwater or geology hinder infiltration
- The runoff/storm event percentiles being captured by retention basins was between 80% and 85%, with one community requiring 91%.

When asked if the current SWM practices being used are effective in protecting the receiving waters and their beneficial uses, the responses were mixed.

In California:

- 42% believe their SWM practices had a positive impact the receiving waters.
- 5% believe their SWM practices did not have a positive impact the receiving waters.
- 47% did not know if their SWM practices had a positive impact the receiving waters.

In all other states, excluding California:

- 50% believe their SWM practices had a positive impact the receiving waters.
- 0% believes their SWM practices did not have a positive impact the receiving waters.
- 50% did not know if their SWM practices had a positive impact the receiving waters.

A number of MS4s have prolonged periods of frozen ground to deal with.

The respondents reported that there were a number of factors affecting their ability to retain and infiltrate stormwater runoff in at least a portion of their community.

- 52% reported presence of steep slopes/gradients
- 59% reported extensive areas of low permeability soils
- 17% reported areas shallow bedrock
- 41% reported areas high groundwater
- 31% reported presence of highly erosive soils
- 34% reported areas of groundwater contamination
- The percentage of the total area affected by these constraints varied from 10% to 100% of the MS4's service area,

Some states have water rights laws/regulations that do not permit stormwater harvesting and reuse.

Cost of compliance with MS4 permit with federally mandated stormwater infiltration requirements.

- **100%** of the respondents believe or know that the cost of administering their MS4 permits will *increase*.
- Not a single respondent believes or knows that the cost of administering their MS4 permits will *decrease*.
- Not a single respondent believes or knows that there will be *no effect* on the cost of administering their MS4 permits.

TECHNICAL ISSUES RELATED TO UNIFORM NATIONAL STANDARDS OR CRITERIA

Hydrologic Diversity

EPA's own studies show that hydrology throughout United States is complex and varies greatly by location and coastal and orographic influences. For example, the 95th percentile 24-hour rainfall depth ranges from 0.7 to 1.8 inches, a factor of 2.5.

Also, the unpublished report prepared in 1989 for EPA by Eugene D. Driscoll Gary E. Palhegyi Eric W. Strecker, and Philip E. Shelley titled *Analysis of Storm Event Characteristics for Selected Rainfall Gages throughout the United States* is even more revealing. Driscoll, et. al. analyzed long-term records of hourly precipitation data collected by the federal government throughout the United States. They reduced all the data to the characteristics of individual storms, after defining an individual storm. Based on statistical evaluation, they settled on the definition that a new storm occurs if there are at least 6-hours of zero precipitation. This permitted and encouraged the stormwater professional to look at individual storm events rather than arbitrary statistical definitions such as the 95th percentile 24-hour depth which often represents a series of individual storms. Some interesting facts emerged. For instance, the average annual number of storms in the United States ranged from less than 6 to more than 77 (a factor exceeding 10). The average duration of the storms ranged from less than 7 hours to more than 17. The average hourly intensity of storms ranged from 0.035 to 0.209 inches per hour and the average depth of storms ranged from less than 0.3 to more than 0.8 inches. And, these differences do not follow the same trends; for instance, increasing average storm duration does not mean proportionate increases in average storm intensities or depths.

This argues for not having a single national standard for sizing BMPs, which could be counterproductive to locally sustainable stormwater management. It is best to let states, localities, and/or regions develop their own hydrologic sizing requirements that are based on local precipitation characteristics. The term "precipitation" is used since not all of it is rainfall. In much of the country precipitation occurs in the form of snow on frozen ground which then melts at different rates, depending on location and weather patterns. This fact also needs to be recognized when developing local BMP sizing and design standard.

In fact, there are a number of MS4s in United States for which local BMP selection, sizing and design standards are in place at this time. They were, for the most part, developed using local precipitation records and local geologic, hydrologic and receiving water conditions. Mandating one size fits all national BMP requirements will not only ignore the non-federally funded work that was done by these communities, but will undermine their standards without incremental improvement on the impacts to their receiving waters.

Findings in Refereed Literature on Effectiveness of Extended Detention Basins in Controlling Geomorphic Impacts.

In parallel with and following up on Driscoll's rainfall characterization described earlier, James C.Y. Guo and Ben Urbonas also examined long-term precipitation records for a number of cities selected to represent various climatic conditions of the contiguous territory of United States. Their findings, after considerable peer review, were published in the American Society of Civil Engineers (ASCE) Journal of Water Resources Planning and Management, Vol. 122, No. 1, January 1996, titled: *Finding a "Maximized" Water Quality Capture Volume by Runoff Capture Ratio*. Their investigation revealed that every rainfall data set, after processing it through a runoff model, exhibited a point of diminishing returns when sizing BMPs to capture stormwater runoff. This occurs between 82nd and 88th percentile runoff event. Moving to the 95th percentile runoff event doubles that volume but returns very little in terms of protecting receiving water integrity. The ASCE and Water Environment Federation (WEF) have included a protocol based on the Guo and Urbonas work in their joint Manual of Practice for the sizing and design of BMPs. This protocol has also been adopted by a number of municipalities in western United States.

There exists an unfounded perception by some that extended detention basins do not provide adequate protection for the receiving waters. C. A. Pomeroy, et. al. in 2008 published a report for the Water Environment Research Foundation, titled: *Protocols for Studying Wet Weather Impacts and Urbanization Patterns*. In it they demonstrated that the use of a relatively modestly sized urban runoff capture volume (approximately the 80th percentile runoff event) and its release over extended periods of time (40 hours) in Ft. Collins Colorado and Atlanta, GA, in combination with control of 2-, 10- and 100-year peak flows, result in very little increase in the geomorphic "work" ("work" used here in a term in physics indicating the total effect on an object) on the receiving streams, thus minimizing over 90% of one of the biggest impacts of urbanization on them.

In other words, it is possible, through the use of consolidated runoff capture and treatment basins, ponds, wetlands and other types of BMPs to limit the negative impacts on receiving waters as areas urbanize. Unfortunately, neither EPA nor the delegated states have followed up on investigations of what extended detention capture volumes in different parts of United States, in combination with other cost-effective inexpensive practices, will accomplish in limiting to acceptable levels the negative impacts on receiving waters. These types of BMPs are currently a part of the "toolbox" of stormwater management facilities and should not be discarded for others that do not have the long record of use, study and performance. However, EPA staff have publically expressed that extended detention practices are ineffective while the evidence exists that they can be very effective stormwater management facilities.

Whole-Life Cycle Cost Investigations in the Denver region.

Currently unpublished investigations in the Denver region revealed that lot-based retention BMP systems have whole-life cycle costs that are about twice as much as more centralized facilities. These investigations were done by the Urban Drainage and Flood Control District (UDFCD) and the Urban Watersheds Research Institute (UWRI) using a spreadsheet model that was developed by Colorado State University for the UDFCD. These estimates included the costs of planning, design, construction, construction oversight, maintenance, inspections by the MS4 and the oversight and administration of the BMPs in the ground by the MS4. Designs were based on the local sizing and design recommendations for all BMPs.