National Association of Flood & Stormwater Management Agencies
1333 H Street, NW, 10th Floor West Tower, Washington, DC 20005
Phone: 202-289-8625 Fax: 202-530-3389 www.nafsma.org

Testimony of the National Association of Flood And Stormwater Management Agencies

Presented by Timothy A. Richards, PE
NAFSMA Director and Stormwater Committee Chair
Deputy City Engineer, City of Charlotte, North Carolina

Efforts to Address Urban Stormwater Runoff

U.S. House of Representatives
Committee on Transportation and Infrastructure
Subcommittee on Water Resources and Environment

Rep. Eddie Bernice Johnson, Chairwoman

March 19, 2009

The National Association of Flood and Stormwater Management Agencies (NAFSMA) is very pleased to submit this testimony regarding "Efforts to Address Urban Stormwater Runoff" on behalf of its membership.

Background on NAFSMA

NAFSMA is a 30-year old national organization based in the nation's capital that represents close to 100 local and state flood and stormwater management agencies, most of which are in large urban areas. Its members serve a total of more than 76 million citizens by providing flood and or stormwater management and as a result, the association has a strong interest in the proposed discussion on urban stormwater runoff.

The mission of the Association is to advocate public policy and encourage technologies in watershed management that focus on issues relating to flood protection, stormwater and floodplain management in order to enhance the ability of its members to protect lives, property, the environment and economic activity from the adverse impacts of storm and flood waters.

It is important to note that many of NAFSMA's member agencies are currently Phase I or II jurisdictions falling under the Clean Water Act's NPDES Permit Program.

Formed in 1978, NAFSMA works closely with the U.S. Environmental Protection Agency, the Corps and the Federal Emergency Management Agency to carry out its mission. NAFSMA members are on the front line protecting their communities from loss of life and property, while protecting and if possible, improving the quality of the nation's surface and ground waters. Therefore, the organization is keenly aware that all options for mitigating damages that can be caused by urban stormwater runoff should be considered as tools to meet clean water goals.

NAFSMA is pleased to present these views and suggestions on efforts to address urban stormwater runoff and understand the focus of today's hearing is on Green Infrastructure and low impact design approaches. We will be sharing with you the opinions of our member agencies as they relate to general comments on these approaches, barriers to their implementation and recommendations for alleviating these barriers.

General Comments on Green Infrastructure and Low Impact Design Approaches

NAFSMA supports the spirit and intent of the Clean Water Act and the use of tools such as the NPDES Permit Program and adaptive management to help jurisdictions determine the appropriate activity towards protecting and cleaning the nation's waters.

Many agencies, represented by our members throughout the country, at their own expense and without Federal funding, are making significant improvements in managing stormwater quantity and quality and have been largely successful in awakening their residents, businesses and leaders to the importance of reducing pollution resulting from non-point sources. Non-point source pollution is caused by rainfall and snowmelt runoff that moves over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and even our underground sources of drinking water.

NAFSMA believes that it must be recognized that non-point sources of pollution cannot be addressed the same way as point source pollution resulting from activities like industrial or municipal sewage treatment plants. It is impractical and most likely impossible for local jurisdictions to use end-of-pipe treatment techniques (treatment plants) to reduce pollution from non-point sources as is customarily done for point sources. Management of non-point sources is more appropriately performed through better site planning and design measures, as well as "best management practices" such as public education on non-point sources, public involvement in protecting and cleaning waterways, non-structural and structural solutions such as zoning and land use rules, Green Infrastructure and conventional stormwater management.

For purposes of this testimony, Green Infrastructure will be considered, as defined by the US EPA, "…An adaptable term used to describe an array of products, technologies, and practices that use natural systems – or engineered systems that mimic natural processes – to enhance overall environmental quality and provide utility services. As a general principal, Green Infrastructure techniques use soils and vegetation to infiltrate, evapotranspirate, and/or recycle stormwater runoff. When used as components of a stormwater management system, Green Infrastructure practices such as green roofs, porous pavement, rain gardens, and vegetated swales can produce a variety of environmental benefits."

Low Impact Design techniques are intended to produce a hydrologically functional site that mimics predevelopment conditions. For purposes of this testimony, we will consider low-impact design approaches to be a component of Green Infrastructure.

NAFSMA would like to acknowledge that many of the Green Infrastructure techniques are very successful in reducing the amount of runoff, as well as certain pollutants from stormwater runoff, such as total suspended solids, nitrogen, certain metals and even bacteria. However, data shows that in certain cases some of these practices actually cause increased levels of nutrients in runoff as well and we have to be careful of its wholesale application throughout the country without

further research. We encourage their use in those areas where site conditions are suitable, and should be considered an important strategy in managing stormwater runoff. Green infrastructure techniques should be considered along with other complimentary strategies to provide for flexibility and innovation. We by no means want to state an all encompassing opposition to the use of Green Infrastructure or low impact design techniques; rather, we propose a balanced approach to the use of Green Infrastructure together with, and as a supplement to conventional stormwater management.

As described by the EPA, NAFSMA considers Green Infrastructure to be a "component" of a stormwater management system, appropriate in certain situations, but by no means the sole solution or even generally preferred method of addressing the nation's water quantity and quality management. As such, we provide the following barriers to implementing Green Infrastructure.

Barriers to Implementing Green Infrastructure

NAFSMA believes Green Infrastructure should neither be prescribed as the preferred tool for addressing stormwater quality nor used in a regulatory fashion. The following information reflects our opinions as to why Green Infrastructure should remain simply a component of a stormwater management system and/or an optional mechanism for complying with the Clean Water Act's Permitting Program. Our opinions are listed in no particular priority order.

1. **Green Infrastructure is not more appropriate for some parts of the country, but not for others.**

   Green Infrastructure techniques such as rain gardens often rely on infiltration of stormwater runoff into the ground as a means of both filtering the pollutants out of the runoff as well as recharging the groundwater. In areas where ground infiltration occurs readily, this process works well. In other areas of the country, the naturally occurring clay and plastic soils limit infiltration measures, making them very difficult, ineffective and expensive to construct and maintain. These areas rely on modifications to Green Infrastructure techniques including, but not limited to providing pipe systems to drain the system artificially, thus providing treatment with minor reductions in runoff and little groundwater recharge. If Green Infrastructure is to be used in such areas, it will be necessary to supplement those techniques with conventional stormwater management techniques to achieve pollutant removal efficiencies necessary to meet regulatory requirements and accomplish clean water goals.

In this respect, it is important to note that different management techniques are available to address runoff at different spatial scales. Green Infrastructure techniques are designed to address the smallest scale at the parcel or neighborhood scale, and this is considered desirable from a point source control point of view. However, there are major efforts at watershed planning in our country where a system of integrated regional facilities are part of a system of controls that also can be cost effective in protecting our receiving waters.

Thus, Green Infrastructure may be an appropriate response to urbanization in some regions and communities, but not so for other locations. For example, in some parts of the country such as the Southeast, a primary degradation concern is stream bank erosion. In such areas of naturally erosive soils, a large contributor of pollutants to streams and rivers and the ponds and lakes they feed, is sediment generated from the streams themselves. In such situations, it is clearly necessary to control excess runoff through the utilization of techniques that control the quantity of runoff and may include conventional stormwater detention techniques, as well as Green Infrastructure. Again, the key is to provide planners and managers flexibility in selecting the most appropriate mix of management tools, taking into account the site conditions, planning opportunities, and beneficial uses of receiving waters subject to stormwater discharges.

In addition, infiltration of surface waters to groundwater has been shown to, in some instances, increase certain pollutant concentrations in groundwater. These potential risks must be considered when evaluating Green Infrastructure as a stormwater system component.

Frequent reference to incorporation and implementation of "LID principles" are made. A clear goal and definition of these LID principles as they apply to various climates, such as semi-arid Riverside County, California is needed to ensure a consistent understanding of compliance expectations. It is particularly important to ensure that these principles do not conflict with water conservation or urban density policies, objectives, or requirements. LID principles for coastal or wetter areas may not be applicable to the warmer and more arid climates. For example, use of green roofs in these areas needs the installation and use of lawn watering systems, increasing water consumption. We would like to emphasize that LID is a tool to achieving compliance, and it is not desirable or appropriate to require implementing LID as a compliance measure.

2. **Green Infrastructure may be appropriate for developments such as larger lot single-family development, but can be problematic for higher density development.**

Green Infrastructure techniques are commonly based on controlling stormwater at the source by the use of micro scale controls that are distributed throughout the site. Proponents often claim Green Infrastructure is useful for managing stormwater in high density development where a small development footprint on the landscape can be achieved. This may be true in certain situations; however, our experience is that in high density development, the land comes at a premium, available at all, and utility of the land for parking, buildings and pedestrian movement often prohibits even the small amount of property required for rain gardens, vegetated swales or infiltration trenches. Moreover, we are sensitive to geotechnical concerns regarding infiltration near foundations or steep slopes, which may limit the applicability of some Green Infrastructure techniques. Given this space limitation, it is often more prudent to allow higher density development to participate in paying for more conventional measures like dry and wet detention basins that serve a more regional function.

3. **The development market place has not shown broad support of Green Infrastructure techniques.**

Green Infrastructure, by its very nature, involves the use of systems which have to be placed on private home property and require perpetual property owner responsibility and expense. While this would appear to offer the benefit of nature up close and personal, many buyers want a cleaner, more well-defined streetscape and lawn area that offers close to maintenance-free assurance. In addition, Green Infrastructure application also requires extensive local government oversight and administration. Our position therefore is that we must educate our citizens and developers about the utilization of Green Infrastructure techniques, and when and under what circumstances they are appropriate, and that endorsement of Green Infrastructure strategy is not desirable in general, and certainly not at this somewhat early stage.

4. **Green Infrastructure could mean an exponential increase in the number of measures and facilities being implemented, operated and maintained in a municipality.**

Since the techniques employed in Green Infrastructure seek to mimic pre-development conditions, it is necessary to capture stormwater runoff at or near its source. In other words, the runoff cannot travel very far before it needs to be captured, slowed and infiltrated to appropriately mirror the pre-developed hydrology. This requirement creates the need to construct many small structural features, such as rain gardens to accomplish this. Conventional stormwater management allows the runoff to be carried further

downstream, into regional facilities. It is not unreasonable to expect an increase of 10 – 40 or more times the number of actual treatment facilities required by using Green Infrastructure versus conventional stormwater management. Being able to capture a larger drainage area in fewer structures (albeit larger ones) allows the construction, oversight by the permit holders, administration, maintenance and rehabilitation to be focused in fewer areas of the development. As a result, administration and maintenance is simplified, aesthetic and functional issues are more easily addressed, the inspection and logistics of repair are reduced, and effectiveness of performance is more easily maintained.

We have found that it is often very difficult to get private homeowners or Homeowner Associations to adequately maintain the many rain gardens and swales that invariably have to be constructed on or very near private property. It is even more challenging when these facilities on private properties will need to be rehabilitated. The decentralized approach conflicts with the homeowner's sense of what is their property, and what can or cannot be done in these areas, as well as creates issue over what *must* be done to keep the devices functional. This has the potential to become a significant administrative burden.

5. **The financial burden of Green Infrastructure has the capacity to be much greater than conventional stormwater management.**

Studies and actual results of programs run by our member agencies have shown that the costs of not only capital construction, but even more so, costs associated with administration, maintenance and rehabilitation of Green Infrastructure can be much higher than conventional stormwater management. A study in the Denver, Colorado area showed that total costs for construction, administration, maintenance and rehabilitation of rain gardens to be over six times the costs for conventional stormwater management techniques in a 50-year life cycle analysis of a given site. The 50-year analysis showed the total costs for a 100-acre multi-family development be approximately $38 million (Green Infrastructure) compared to approximately $6 million (conventional measures).

This cost has to be borne by both the private property owner, through individual costs or Homeowners Association dues, and the municipality providing administration of programs requiring the measures or the complete assumption of all these facilities by municipalities, which complicates their use even more. The home and/or business owner eventually pays, either through self financing or supportive funding of governmental stormwater programs through fees and/or taxes.

In Charlotte, North Carolina, we have shown that in some high density areas, a practical physical solution for managing water quality on-site is a Green Infrastructure technique called porous pavement. However, the construction costs alone for this measure are approximately $200,000 per acre, compared to $25,000 - $40,000 per acre for bio-retention ponds to a low of $10,000 per acre for conventional stormwater management ponds. It is clear that in even the most difficult of economic times, conventional measures can be affordable to build and maintain, while assuring continued performance. Conventional measures can also be as effective and attractive, while providing other ecological benefits (such as wildlife habitat and open space) as Green Infrastructure features.

That said, there are studies, including studies that indicate cost savings associated with Green Infrastructure. In some instances, comparing Green Infrastructure to conventional techniques in their pollutant removal role is valid; however, we must not forget that stormwater management also involves making sure the capacity of the system is adequate to handle flood waters and provide for public safety. Green Infrastructure inherently promotes the use of small structures to catch the "first flush" of runoff to treat the pollutants through infiltration. To make this happen, you have to have more structures capturing small amounts of water so that they are not overrun in larger runoff events. Even with Green Infrastructure being in place, there still needs to be a by-pass system large enough to keep our homes, businesses and streets from harm's way of flooding. As a result of this necessity, the claimed cost savings of Green Infrastructure approaches may be appropriate for water quality, but do not include the costs required for flood management.

6. **Lawsuits by environmental groups (claiming Green Infrastructure should be mandatory) is taking money away from, and delaying implementation of, effective stormwater management programs.**

In the State of Washington, a recent ruling by the Washington Pollution Control Hearings Board, ruled in favor of writing certain Phase II NPDES permits to make Low Impact Design (LID) "allowable when feasible", rather than "mandatory when feasible". The Board recognized that there are many issues to be resolved concerning the feasibility of LID, construction and performance standards, technical guidance and acknowledging that LID is still relatively new and should not be mandatory.

Many State agencies are requiring Green Infrastructure or LID to be used in all development regulations, despite concerns cited by the Washington Board.

The cost of defending lawsuits focused on making LID mandatory is taking away money that could be used for testing new Green Infrastructure techniques to learn what does and does not work best.

7. **Technical and local barriers exist that will take time and education to overcome**

   Discrepancies and contradictions with new LID strategies exist in the existing local regulations such as building, fire, plumbing, or health codes. (For example: mosquito issues with rain barrels, turf requirements and incentives for drought tolerant planting, health concerns with stormwater reuse, etc.). Developers and design professionals have not yet transitioned from conventional site design practices to new LID design concept. Furthermore, LID designs have not been standardized for wide application and easy enforcement. Design reviewers or building plan checkers must have standard procedures in place and be trained in LID design concepts.

8. **LID needs to complement and support Smart Growth (anti-sprawl) development concepts and other regional planning activities**

   It is important to think about scale when considering low impact development. Low Impact Development is often equated with local, distributed BMPs on individual sites. In fact in recent draft stormwater permits in California the overriding desire to mandate LID implementation through the use of limiting effective impervious areas will actually exacerbate urban sprawl. LID needs to be balanced with Smart Growth (transit friendly and anti-sprawl) development concepts and other regional planning activities such as Habitat Conservation Plans, Special Area Management Plans, etc. Both large and small scale activities need to be identified and credited.

9. **LID cannot be defined as a specific or effective impervious area for permitting purposes.**

   Due to varying site soil, slope and rainfall character, it is not possible to standardize LID (Green Infrastructure) to equal an effective impervious area. Permittees support the concept of using a prioritization system to ensure that proposed LID BMPs promote infiltration, reuse and/or evapotranspiration and are encouraged prior to considering more traditional treatment control technologies where physically and financially feasible.

Recommendations for alleviating the barriers

1. **Increase funding for research and science for stormwater management.**

   It is clear that there is a real need for more study and research into the relationships between stormwater and receiving water quality. While there are opinions from all sides on what is most effective, the best strategy is one that allows one to develop an integrated control strategy in the context of site conditions and constraints, regional planning efforts, and institutional and political opportunities. Funding for pilot programs along with monitoring of both site-level and watershed-level effectiveness is needed to make good decisions. This monitoring is very expensive, requires significant amount of time and is often financially impossible for local jurisdictions to accomplish on their own. Federally-funded grants and supportive programs are needed to supplement what many of our member agencies are already trying to do on their own, which is utilize the EPA-recommended approach of adaptive management to improve on what we learn by trying different approaches, then monitoring their effectiveness before revising the approach. This takes many years and huge amounts of money to accomplish and if the responsibility continues to fall on the local jurisdictions, we will lose.

2. **Continue to educate and involve leaders, municipal officials, developers and the public on stormwater management issues.**

   One of the most useful best management practices for protecting and improving water quality is education and public involvement. We need to continue to highlight the need for educating everyone on known causes of water quality pollution and help them find ways to participate in protecting and cleaning the nation's waters. Each person plays a role in environmental stewardship, whether as a human being, resident, official or professional. Knowing how we can effectively support clean water goals in our role is the first step to meeting those goals.

3. **Congress should encourage, rather than mandate Green Infrastructure when and where feasible and economically sustainable.**

   NAFSMA supports the Washington Pollution Control Hearing Board ruling of encouraging rather than mandating Green Infrastructure and requests that in any Congressional considerations regarding the use of LID or Green Infrastructure requirements in the Phase I or II NPDES permit programs, that these techniques not be made mandatory, but remain optional or allowable.

We believe this direction from the Federal government would go a long way in promoting what the EPA has stated as their goal of using an adaptive management philosophy of managing stormwater and related receiving water quality. It is this adaptive management process that will allow us to scientifically and procedurally remove methods that in the long run may turn out to be too costly, ineffective and infeasible, thus also not meeting the "Maximum Extent Practicable" basis of NPDES permitting.

NAFSMA very much appreciates this opportunity to testify. Please feel free to contact me at 704-336-4555 or Executive Director Susan Gilson at 202-289-8625 with any questions.