

UNI-GROUP U.S.A.

UNI Eco-Stone[®] Permeable Interlocking Concrete Pavement

U. S. Environmental Protection Agency

*National Pollutant Discharge Elimination System (NPDES), National Water Program Guidance,
Strategic Plan and Smart Growth*

Approximately 40% of America's surveyed waterways are still too polluted for fishing or swimming and 90% of our population lives within 10 miles of these bodies of water. Numerous studies indicate that stormwater runoff is also the primary source of pollutants found in surface waters and often contains a toxic combination of oils, pesticides, metals, nutrients, and sediments. With the implementation of the USEPA's National Pollutant Discharge Elimination System (NPDES) stormwater regulations in the early 1990s, state agencies, municipalities, and regional authorities began searching for new options in stormwater management. Effective management of stormwater runoff offers a number of benefits, including improved quality of surface waters, protection of wetland and aquatic ecosystems, conservation of water resources, and flood mitigation. Traditional flood control measures that rely on detention of peak flow are typical of many stormwater management approaches, but generally do not target pollutant reduction, and often cause unwanted changes in hydrology and hydraulics. The EPA recommends an approach that integrates control of stormwater flows and the protection of natural systems to sustain aquatic habitats.



Effective stormwater management is often achieved through a comprehensive management systems approach instead of individual practices. While some individual practices may not be effective alone, they may be highly effective when used in combination with other systems. The EPA encourages "system building" to allow for the use of appropriate site-specific practices that will achieve the minimum measures under Phase II of NPDES. Governing authorities must develop and implement strategies that include a combination of structural and/or non-structural BMPs appropriate for their communities. Structural practices include storage practices, filtration practices, and infiltration practices that capture runoff and rely on infiltration through a porous medium for pollutant reduction. Infiltration BMPs include detention ponds, green roofs, bioswales, infiltration trenches, and permeable pavements. Non-structural practices are preventative actions that involve management and source controls. Many states and

municipalities have incorporated the EPA regulations into their stormwater design and BMP manuals as they attempt to deal with increased impervious cover, stormwater runoff, and over-taxed drainage and sewer systems. Effective stormwater management is often achieved through a comprehensive management systems approach instead of individual practices. Some individual practices may not be effective alone, but may be highly effective when used in combination with other systems. Ordinances or other regulations are used to address post-construction runoff from new development or redevelopment projects. In addition, it is important to ensure adequate long-term operation and maintenance of BMPs.

For years, porous pavements consisted of open-graded or no-fines cast-in-place concrete or asphalt, which had earned a poor reputation due to their tendency for clogging, and there was no way to renew porosity. Today, permeable interlocking concrete pavements offer a better solution. The Eco-Stone[®] family of permeable interlocking concrete pavers (PICP) is designed to mitigate stormwater runoff through infiltration, thereby reducing volume flows, improving water quality, and recharging groundwater. The original permeable paver, Eco-Stone[®], is a true interlocking concrete paver that offers the structural support and stability of traditional concrete pavers, combined with the environmental benefit of stormwater management. ECOLOC[®] offers the same infiltration benefits as Eco-Stone[®], but offers increased structural strength and stability for industrial pavement applications. New to the Eco-Stone family of permeable pavers are Eco-Optiloc[®] and Eco-Priora[™] permeable pavers. These pavers may be combined with traditional versions of the pavers – Optiloc[®] and Priora[®] for both solid and permeable pavement areas. Newer products may not be available in all areas, so contact your local UNI[®] manufacturer in your area for more information.

PICPs are considered structural BMPs under infiltration practices. From an engineering viewpoint, permeable pavements are essentially infiltration trenches with paving on top that supports pedestrian and vehicular traffic. By combining infiltration and retention, Eco-Stone[®] permeable interlocking concrete pavements offer numerous benefits over other types of structural infiltration systems. Permeable pavements work well in conjunction with other recommended BMP infiltration practices such as swales, bioretention areas, and rain gardens.

National Water Program Guidance - The EPA's Office of Water is using a large share of the resources available to the National Water Program (Clean Water Act), to support efforts to restore and improve the quality of rivers, lakes, and streams on a watershed basis. Over the next several years, EPA will work with the states to assure the continued implementation of clean water programs and watershed protection efforts.

The **EPA Strategic Plan** is a five-year plan that calls for implementation of core clean water programs to improve and protect water quality, as well as implement effective nonpoint source practices on a watershed basis, development of **Total Maximum Daily Loads** (TMDL), improving water quality monitoring and assessment, and strengthening the NPDES permit program and water quality standards program. Programs such as the Targeted Watershed Grants Program and Section 319 Monitoring

Program will be expanded and receive additional funding. Additional grants are also available, including Water Quality Cooperative Agreement grants, Section 106 State program support grants, and Clean Water State Revolving Fund capitalization grants. States will be required to review water quality information and consider improvements to existing watershed protection efforts. Regions will work with states on how to accomplish these watershed protection improvements. The Clean and Safe Water goal of the Strategic Plan states: Ensure drinking water is safe. Restore and maintain oceans, watersheds, and their aquatic ecosystems to protect human health, support economic and recreational activities, and provide healthy habitat for fish, plants, and wildlife.

In 1999 and 2001, the International City/County Managers Association (ICMA) and the EPA released the frame-work for "Smart Growth" policies that communities around the country could adopt to meet environmental, community, and economic goals. Simultaneously, organizations such as the Low Impact Development Center and the Center for Watershed Protection began advocating low impact development (LID) as a way to preserve and protect the nation's water resources. They promote comprehensive land planning and engineering design, watershed planning and restoration, and stormwater management approaches that protect water resources and attempt to maintain pre-existing hydrologic site conditions. Their goal is to achieve superior environmental protection, while allowing for sustainable development. In July of 2004, the EPA issued a report Protect Water Resources with Smart Growth. Smart Growth is defined as development that is good for public health, the economy, and the environment. The report lists 75 approaches that state and local governments, as well as water quality professionals, can use to achieve their smart growth and water quality goals. According to the report, adverse effects of communities' growth and development include the loss of woodlands, wetlands, meadowlands, and increased pollution runoff. The program features numerous publications, implementation programs, conferences, speaker series, grants, and awards.

The EPA began working with these organizations in 2006 to promote the use of LID and Smart Growth as a way to manage stormwater runoff. The goal is to protect water resources at the regional level by encouraging states and municipalities to implement policies that consider both growth and conservation simultaneously. These approaches are quickly gaining favor across the country and are being incorporated into local development regulations to help meet stormwater runoff requirements and provide more livable, sustainable communities. One of the primary goals of LID design is to reduce runoff volume by infiltrating rainwater on site and to find beneficial uses for the water as opposed to utilizing storm drains. LID objectives include the reduction of impervious cover, preservation of natural landscape features, and the maximization of infiltration opportunities. Infiltration helps recharge groundwater, reduces urban heat island effects, and reduces downstream erosion and flooding. This allows development to occur with much less environmental impact.

Recently, the EPA announced plans to work with the U.S. Green Building Council to incorporate more stormwater aspects into its Leadership in Energy and Environmental Design (LEED®) green building assessment system. The LEED® system is increasingly being adopted by cities and states across the country that now require municipal buildings to meet minimum certification standards.

As the end of the EPA's NPDES permit cycle is approaching for many municipalities, the EPA will be focusing on transitioning into fully implementing and improving the operational phase of the program. The EPA may begin to establish ordinances to move the program in the direction of preferred design and best management practices and provide additional guidance for municipalities. The EPA already offers extensive information and guidance manuals such as *National Menu of BMPs*, *National Urban Management Measures Guidance*, *Using Smart Growth Techniques as Best Management Practices*, *Protecting Water Resources with Higher Density Development*, and *Parking Spaces/Community Places, Finding the Balance Through Smart Growth Solutions*.

The EPA also is developing a comprehensive guide for Phase II communities on post-construction practices in conjunction with the Center for Watershed Protection. This will include detailed guidance on program setup, creating ordinances, Smart Growth, LID, and more. For more information and links to these manuals, please visit our web site at www.uni-groupusa.org.

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