February 1, 2019

New Jersey Department of Environmental Protection
401 East State Street
Trenton, NJ 08625
Submitted via email to rulemakingcomments@dep.state.nj.us

Re: Green Infrastructure Rule – DEP Docket Number 03-18-10 – Proposal Number PRN 2018-111 – Revisions to N.J.A.C. 7:8

American Littoral Society, Association of New Jersey Environmental Commissions, Clean Ocean Action, Delaware Riverkeeper Network, Environment New Jersey, Hackensack Riverkeeper, Musconetcong Watershed Association, Natural Resources Defense Council, New Jersey Chapter of the Sierra Club, New Jersey Highlands Coalition, New Jersey League of Conservation Voters, NY/NJ Baykeeper, Pinelands Preservation Alliance, Raritan Headwaters, Save Barnegat Bay, and the Watershed Institute appreciate this opportunity to comment on the Department of Environmental Protection (DEP)'s proposed amendments to the stormwater management rules published in the New Jersey Register on December 3, 2018.[1]

We support the proposed requirement for development sites to implement green infrastructure practices, subject to certain technical revisions identified in our comments below. However, we cannot emphasize enough that this proposal as a whole does not go far enough and represents a missed opportunity to improve water quality and reduce flooding across New Jersey.

[1] 50 N.J.R. 2375(a), Vol. 50, Issue 23 (Dec. 3, 2018).

Implementing green infrastructure without making any changes to the performance standards governing how much stormwater is captured, treated, or detained on the site will not have a significant impact on runoff pollutant loadings or volumes. The standards themselves must be updated, as explained in these comments and the attached modeling report.

Beyond this overarching comment, we are also strongly opposed to two specific changes that DEP has proposed: eliminating the water quality requirement for non-vehicular impervious surfaces and eliminating the requirement for individual sites to use non-structural strategies. These proposed changes must be removed from the final rule.

On the other hand, we support certain other proposed changes that would help protect water quality: deed notices for stormwater management measures; a stronger standard for the circumstances when variances are allowed (although the proposed standard needs to be strengthened further); new and clarified requirements for stormwater management in combined sewer areas; and the narrow proposed amendments to the definition of "major development."

In summary, we urge DEP to make the following changes to the proposal:

- Replace "filtration" with "evapotranspiration" in the definition of green infrastructure;
- Exclude non-green infrastructure best management practices (BMPs) from the list of approved green infrastructure practices;
- Establish loading ratios for all BMPs along with reduced limits on contributory drainage area;
- Require green infrastructure BMPs to be monitored for at least five years;
- Tighten the "technical impracticability" standard for variances from the performance standards;
- Continue requiring development sites to use non-structural strategies;
- And, critically, abandon the proposal to remove the water quality (TSS) requirement as it applies to runoff from impervious surfaces not traveled by motor vehicles.

Our detailed comments and recommendations follow below.

I. Stronger stormwater rules are needed to protect New Jersey's waters from the harmful effects of polluted runoff.

Stormwater is the greatest threat to water quality in New Jersey. DEP most recently assessed state water quality in its 2014 Integrated Water Quality Assessment Report, which was finalized in 2017.[2] The report demonstrates serious water quality impairments in New Jersey, as

[2] New Jersey Dep't of Envtl. Protection, *New Jersey 2014 Integrated Water Quality Assessment Report* (May 2017), *available at* https://www.state.nj.us/dep/wms/bears/docs/2014_final_integrated_report.pdf (hereinafter "2014 IR").

over 98% of the waters in the state fail to fully meet water quality standards.[3] The report highlights analysis showing increasing concentrations of certain pollutants and a statewide negative trend toward impaired conditions. In particular, analysis contained in the report shows "[d]eclining water quality trends for nitrate, total dissolved solids (TDS), and chlorides."[4] Ambient biological monitoring results reveal "a slight negative trend toward impaired conditions," with one of the strongest trends being "the decline of non-impaired ('Excellent' and 'Good') sites."[5] In short, the Integrated Report demonstrates a concerning trend toward degradation of non-impaired waters.

A significant contributor to the degradation of New Jersey's waters is stormwater runoff. The Integrated Report states that runoff from urban areas is a "likely cause of increased TDS and chloride concentrations over time."[6] Biological trends analysis shows a correlation between biological impairment and land use patterns that result in an increase in polluted runoff, such as increase in impervious surface.[7] Generally, "water quality declines as the intensity of land use increases."[8]

The state's impairment data bear out the close relationship between stormwater runoff and water quality degradation. Sublists 4 and 5 of New Jersey's 2014 Integrated List of Waters identify the sources of New Jersey's water quality impairments. "Urban Runoff/Storm Sewers" is listed as a source of impairment for 942 of the total 2,560 assessment unit/pollutant combinations identified on that list.[9] Thus, urban runoff and stormwater pollution are contributing sources to over one-third of New Jersey's impairments. However, only 1,895 of the 2,560 assessment unit/pollutant combinations on the list have *any* source identified at all, meaning that approximately one-half (942 out of 1,895) of *attributed* impairments are caused by stormwater.[10] And the problem is getting worse: 117 of the assessment unit/pollutant combinations identified as impaired by stormwater were added to the list since 2008.[11]

This information proves that New Jersey's current stormwater regulations for development sites are not strong enough to prevent polluted runoff from degrading water quality

---

[3] "Statewide, 235 miles of rivers and streams, and 1,335 acres of lakes located within 14 of New Jersey's 958 subwatersheds fully support all designated uses (except for fish consumption)." In other words, only 1.5% of subwatersheds (14 out of 958) are meeting most water quality standards. NJDEP, "New Jersey 2014 Integrated Water Quality Assessment Report," https://www.state.nj.us/dep/wms/bears/2014_integrated_report.htm.
[4] 2014 IR at v.
[5] *Id.* at 56.
[6] *Id.* at v.
[7] *Id.*
[8] NJDEP, "New Jersey 2014 Integrated Water Quality Assessment Report," https://www.state.nj.us/dep/wms/bears/2014_integrated_report.htm.
[9] These numbers were calculated from the draft 2014 list and have not been cross-checked against the final list. NJDEP, 2014 New Jersey Integrated Report, Appendix B: Sources of Parameters Causing Use Impairment (Sublists 4 and 5), http://www.state.nj.us/dep/wms/bears/docs/2014_draft_sources_and_causes_of_impairment-sublists_4_and_5.pdf.
[10] *Id.*
[11] *Id.* (tally of entries attributed to urban runoff/storm sewers that were added to the list in 2010, 2012, and 2014).

throughout the state, much less improve conditions in waterways that are already impaired. Under the New Jersey Water Pollution Control Act, improving water quality is a requirement under state law.[12] That act requires the state:

> [T]o restore, enhance and maintain the chemical, physical, and biological integrity of its waters, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial and other uses of water.[13]

As the stormwater regulations derive, in part, their authority from the Water Pollution Control Act, the obligation to restore, enhance and maintain the State's waters is the standard by which the current rules and this proposal should be judged.

The insufficiency of these rules led some of our organizations to submit a petition in 2014 asking DEP to strengthen them within the context of renewing the state's municipal stormwater (MS4) permits.[14] Years of sustained advocacy by our organizations and others have put the Department on repeated notice of the need to fix the stormwater rules. Now that DEP is finally moving forward with proposed updates, it faces a critical opportunity to protect and restore New Jersey waters. However, the proposed rule in its current form misses that opportunity by leaving the core elements of the current rules unchanged. DEP itself has recognized that the performance standards in the rules need to be reconsidered.[15] Yet after all the time DEP has spent working on this proposal, it represents only a small, incremental step that does not address the underlying insufficiency of the regulatory standards.

II. The proposed rule does not go far enough to protect New Jersey's waterways and communities from stormwater-related harms.

While DEP's proposal does include certain provisions that improve upon the requirements of the current stormwater rules (as discussed in more detail below), it falls short of

---

[12] N.J.S.A. 58:10A-1.

[13] *Id.*

[14] American Littoral Society, Clean Ocean Action, Delaware Riverkeeper Network, Hackensack Riverkeeper, Natural Resources Defense Council, New Jersey Environmental Lobby, NY/NJ Baykeeper, Pinelands Preservation Alliance & Stony Brook-Millstone Watershed Association, Petition Requesting the Modification (or Revocation and Reissuance) of New Jersey Pollutant Discharge Elimination System Permit Numbers NJ0141852, NJ0141861, NJ0141887, and NJ0141879 (Tier A Municipalities, Tier B Municipalities, Highway Agency, and Public Complex General Stormwater Permits) (Feb. 4, 2014), *available at* http://switchboard.nrdc.org/blogs/llevine/NJ%20MS4%20Permit%20Petition%202-4-14%20%28with%20exhibits%29.pdf.

[15] *See, e.g.*, Email from Adriana Caldarelli, NJDEP, to public stakeholders, March 27, 2014 (attached) ("[W]e would like to explore other options [for replacing the Nonstructural Strategies Point System], specifically, the addition of numerical targets to the other design and performance standards (groundwater recharge, stormwater quantity and stormwater quality) to meet the goals of the nine strategies in the nonstructural standard.").

making the changes needed to curb the polluted runoff that continues to degrade New Jersey's natural resources.

The core requirements of the current stormwater rules are the performance standards for groundwater recharge, water quality, and water quantity that apply to all regulated major developments.[16] Under these standards, development projects must achieve groundwater recharge equivalent to average annual pre-construction groundwater recharge for the site, must meet sediment removal requirements, and must not cause any increase in peak runoff rates from pre-construction conditions.[17]

These standards are too lax to protect receiving waters. Maintaining pre-construction conditions is often insufficient to prevent water quality degradation—and is, by definition, never sufficient to restore water quality in a watershed that is already impaired by stormwater. In the case of redevelopment projects where considerable impervious surface coverage already existed, the pre-construction standard requires no reduction in the quantity of runoff from the redeveloped site. Even for new development projects, maintaining pre-construction recharge volumes and peak runoff rates still fails to avoid water quality impacts because the runoff leaving the site carries more pollutants than the same amount of runoff from undeveloped land in a natural state. Moreover, controlling peak discharge does nothing to mitigate the overall increase in runoff volumes from a site, which is why the National Research Council has cautioned that "effective hydrologic mitigation for urban development cannot just aim to reduce post-development peak flows to predevelopment peak flows."[18] The history of declining water quality in New Jersey in recent decades bears out the insufficiency of these requirements.

Because the rules' numeric performance standards govern the quantity and quality of runoff leaving the site, requiring the use of different best management practices (BMPs) to meet the same standards will not produce meaningfully different results. In the rule proposal, DEP asserts that green infrastructure BMPs will provide improved water quality as compared to other types of BMPs. Yet the proposal does not explain how a site deploying green infrastructure practices would reduce pollution and/or runoff volumes more than a site using traditional BMPs when both sets of stormwater controls are designed to meet the exact same regulatory standards for recharge, peak flows, and sediment reduction. To the extent that DEP believes the green infrastructure scenario would in fact produce a better water quality outcome, it has not provided any quantitative evidence to support that belief.

The lack of support for DEP's assertion matters because the current performance standards are too weak to protect New Jersey communities from stormwater-related harms, and if the green infrastructure proposal will not yield a meaningful improvement over the status quo, it

[16] N.J.A.C. 7:8-1.2, 7:8-5.
[17] N.J.A.C. 7:8-5.4.
[18] National Research Council, *Urban Stormwater Management in the United States* at 6 (2009), *available at* http://www.nap.edu/catalog.php?record_id=12465.

falls short of what is needed and must be strengthened prior to adoption. We urge DEP to take this opportunity to incorporate stronger performance standards into the rules that will actually require development sites to reduce their discharges of polluted runoff, protect waterways, and prevent flooding.

Specifically, DEP should adopt a volumetric standard that requires regulated sites—both new and redevelopment—to retain on-site the water quality design storm volume with no discharge to surface waters. Because greater runoff volumes lead to more pollution, reducing stormwater runoff by retaining it on-site can dramatically reduce the pollutant loads from development.[19] Retaining and reducing runoff volume is more effective than relying on runoff quality standards because "the constituents remaining even in 'treated' stormwater represent a substantial, but largely unappreciated, impact to downstream watercourses,"[20] and because "flow is itself responsible for additional erosion and sedimentation that adversely impacts surface water quality."[21] As a result, the U.S. Environmental Protection Agency (EPA) has found that "[v]olume retention is critical to reduce pollutant loads of all water quality parameters and to reduce erosion of the receiving waterbody."[22]

DEP states in the rule proposal that one of its goals is to "maintain or reproduce the natural hydrologic cycle" on developed sites. Even that modest goal, which as discussed above is not necessarily sufficient to protect water quality, will not be achieved by requiring green infrastructure BMPs if the rules continue to apply performance metrics focused on maintaining pre-*construction* recharge volumes and peak rates. However, natural hydrology can be replicated much more closely by applying an on-site retention standard, as the EPA recommended in its stormwater permitting guide:

> A . . . 'mimicking the natural hydrograph' approach can typically be accomplished by retaining [stormwater] through the mechanisms of infiltration, evapotranspiration, and capture and use. By significantly reducing the volume of stormwater discharges, these mechanisms significantly reduce the discharge of pollutants in stormwater, making discharge volumes the ideal all-around focus and metric for stormwater management.[23]

Again, while maintaining or reproducing the natural hydrologic cycle is not always sufficient to protect receiving waters from the impacts of development, adopting a retention standard would help DEP achieve that goal while *also* effectively reducing pollution loads to local waterways.

---

[19] *See id.* at 9.
[20] *Id.* at 25.
[21] *Id.* at 99.
[22] U.S. EPA, Municipal Separate Storm Sewer System Permits: Post-Construction Performance Standards & Water Quality-Based Requirements, A Compendium of Permitting Approaches, EPA 833-R-14-003, at 3 (June 2014), *available at* https://www3.epa.gov/npdes/pubs/sw_ms4_compendium.pdf.
[23] U.S. EPA, MS4 Permit Improvement Guide, EPA 833-R-10-001, at 54 (2010), *available at* https://www3.epa.gov/npdes/pubs/ms4permit_improvement_guide.pdf.

A modeling analysis performed by Princeton Hydro, attached to these comments as an appendix, confirms that an on-site retention requirement would be far more effective at reducing overall runoff volumes than using green infrastructure to meet the current regulatory standards. Princeton Hydro analyzed the pre- to post-construction change in runoff volume from a hypothetical 10-acre residential development typically representative of the predominant land use in New Jersey. The analysis compares two stormwater management scenarios: one in which green infrastructure BMPs are used to meet the current performance standards (as this proposal would require), and another in which green infrastructure is used to meet the current standards while *also* retaining the full 1.25-inch water quality design storm volume on-site. For both scenarios, the total pre- to post-construction runoff volume is modeled under a range of conditions including all four soil groups and four different storm event sizes, producing 16 modeled simulations for each stormwater management scenario. Under almost all of the simulations modeled (14 of 16), the retention scenario results in significantly less overall runoff volume than the scenario corresponding to this rule proposal.

These results demonstrate why DEP should go beyond what it is currently proposing and adopt an on-site retention standard that will reduce both runoff volumes and pollutant loadings. Stormwater has caused serious damage to New Jersey's waterways over a span of decades. It will take a fundamental shift in how runoff is managed in order to begin to undo that damage, as well as to prevent damage to waters in developing areas that are still in decent condition. An incremental change—like requiring different BMPs to meet the same performance standards that have been in place for many years—will not achieve these goals. The standards themselves must be strengthened. Not only would a retention standard be more effective than the rules' current requirements, it would also be practicable to implement; many jurisdictions around the country have demonstrated the feasibility of implementing volume-based requirements for the on-site retention of stormwater.[24]

Additionally, in conjunction with adoption an on-site retention standard, DEP should make other changes to the rules that will enhance their effectiveness: expanding the universe of regulated sites to include small sites, establishing heightened standards for impaired watersheds, creating requirements to preserve existing natural and open space on the site, and accounting for climate change in the stormwater management rules. Our complete list of suggested changes, previously provided to DEP in response to a request for topics to address in a future rulemaking, is attached to these comments and incorporated by reference.

We understand that DEP is committed to continuing stakeholder engagement regarding "further potential future changes . . . that are not part of this rulemaking."[25] It is clear, however, that DEP must incorporate a retention standard and the other reforms listed above into this

[24] *See* U.S. EPA, Summary of State Post Construction Stormwater Standards (July 2016), *available at* https://www.epa.gov/sites/production/files/2016-08/documents/swstdsummary_7-13-16_508.pdf.
[25] 50 N.J.R. 2375(a).

rulemaking in order to satisfy DEP's obligation to restore, enhance and maintain the State's waters under the New Jersey Water Pollution Control Act.[26]

III. DEP should continue requiring individual sites to use non-structural strategies for stormwater management.

While we agree that the current rules' requirements for non-structural strategies need improvement, DEP's proposal to eliminate those strategies from the section of the rules governing individual sites' compliance obligations does not make sense. Non-structural strategies are absolutely necessary for environmental protection and stormwater reduction. Relocating the nonstructural strategies to the section of the rules governing municipal and regional stormwater management planning (N.J.A.C. 7:8-2.4) would create unnecessary conflict and confusion for developers.

If DEP removes the non-structural stormwater requirements from subchapter 5 of N.J.A.C. 7:8, developers could clear out vegetation and trees, implement rain gardens or other structural BMPs in their place, and receive approval unless towns have ordinances that specifically limit clearance or provide tree protection. This process is detrimental to water quality, habitat, and water supply.

Rather than removing the non-structural stormwater requirements, the Department should leave them in and instead—either now or as part of any future updates to the stormwater management rules—adopt changes that would include a greater description and specific requirements for each one of these strategies. For example, Strategy 1 is "Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss." The rules should require identification of riparian buffers, corridors, highly erodible soils, and wetlands and require no disturbance. Another option is to disconnect anything over 10% of impervious cover to better define Strategy 2. For Strategy 7, towns should require developments to landscape only with native plants unless there are locations or conditions, which DEP can identify, that allow for exceptions. We will provide additional details about these proposals through future stakeholder discussions.

IV. DEP must not exempt non-motor vehicle surfaces from the rules' water quality requirement.

The Department is proposing to eliminate the total suspended solids (TSS) removal requirement as it applies to runoff from impervious surfaces not traveled by automobiles, such as rooftops and sidewalks. We strongly oppose this change and do not believe the Department should remove non-vehicular impervious surfaces from the TSS requirement.

[26] N.J.S.A. 58:10A-1.

Under the current rules, any proposed project that would increase impervious surface by one-quarter of an acre or more must include stormwater quality controls to remove 80 percent of TSS and reduce post-construction nutrient load to the maximum extent feasible. Currently, and correctly, impervious surface is defined as "a surface that has been covered with a layer of material so that it is highly resistant to infiltration by water."[27] The proposed changes, by contrast, would apply the stormwater runoff quality standards when one-quarter acre of *motor vehicle surface* is proposed. While we understand that the rules' current definition has created confusion over what should be considered impervious surface, DEP should not remove non-vehicular impervious surfaces from the TSS requirement. Instead, DEP should revise the existing rule language to clarify that impervious surface includes both vehicular and non-vehicular impervious surfaces.

DEP based the proposed rule change on a finding that runoff from non-vehicular impervious surfaces does not significantly contribute to water quality problems, primarily because runoff from these surfaces contains decreased levels of TSS. However, "*reduced* levels of TSS with a correspondingly *reduced* contribution to adverse water quality impacts," in DEP's words, does not mean that non-vehicular surfaces are not, in fact, contributing to water quality problems. In fact, the opposite is true: it is well documented that non-vehicular impervious surfaces have a significant pollution impact on receiving waterways, via discharges of both suspended solids and other pollutants. They should therefore continue to be considered when determining the total acreage of impervious surfaces subject to the rules' water quality requirements.

The occurrence and concentrations of pollutants in stormwater are dependent on the characteristics of the surfaces that the runoff encounters.[28] Non-vehicular impervious surfaces, such as sidewalks, rooftops, and patios, have characteristics that result in significant pollutant discharges from runoff. For example, roof surfaces are a significant pollutant source in urban catchments.[29] Academic researchers thus recommend that roof surfaces need to be taken into consideration in urban water quality modeling and stormwater quality mitigation strategies.[30] Importantly, roof surface pollutant runoff acts differently than runoff from road surfaces. For roof surface runoff, most of the available pollutant load is removed easily by stormwater, meaning that rooftops are influenced by the first flush phenomenon more significantly than vehicular surfaces are.[31] While levels of nitrogen and phosphorus compounds are relatively low in rooftop runoff, roofs can be a significant contributor of solids and organic carbon loading.[32] In

[27] N.J.A.C. 7:8-1.2.
[28] Eriksson, E., et al., "Selected Stormwater Priority Pollutants – A European Perspective," *Science of the Total Environment*, 383, 41-51 (2007).
[29] Egodawatta et al., "Impacts of Roof Surface Runoff on Urban Water Quality," *Water Science & Technology*, 66(7), 1527-1533 (Aug. 2012), *available at* file:///C:/Users/rhammer/Downloads/Impact_of_roof_surface_runoff_on_urban_water_quality.pdf.
[30] *Id.*
[31] *Id.*
[32] *Id.*

fact, one study found that, cumulatively, the contributions of total solids from roof surfaces significantly exceeded the contributions from road surfaces in three urban watersheds.[33] One reason for this conclusion was that rooftops can make up a greater proportion of land area in a particular watershed than roadways. This finding strongly suggests that DEP's approach of comparing the TSS loadings from an individual rooftop area to the loadings from a comparably sized vehicular surface is misguided. When cumulative rooftop area is considered collectively on a watershed-wide scale, it is clear that these surfaces together contribute significant amounts of TSS to local water bodies.

DEP's proposal also ignores the fact that rooftops discharge other pollutants in runoff beyond TSS. DEP's own stormwater BMP manual acknowledges that rooftops "may be a source of nutrients and other contaminants."[34] By abandoning the water quality requirement for non-motorized vehicle surfaces, the rules ignore the fact that DEP originally chose TSS as a surrogate for other pollutants. In the adoption of the 2004 rule, the Department noted, "Total suspended solids were selected as a surrogate for pollutant removal efficiency because many pollutants are either particulate in nature or adhere to particulate matter. Therefore, settling out suspended solids is an effective means of reducing these pollutants."[35]

A study conducted to determine the contribution of roofing materials in stormwater pollution found that many pollutants were detected in the leachates from the studied roofing materials, therefore ending up in stormwater.[36] The aim of the study was to determine the contributions of specific sources of organic and inorganic pollutants in stormwater from roofing materials. The study focused on conventional roofing materials commonly used in residential houses, apartments, and industrial buildings. Many of the studied materials exhibited the potential to release pollutants into stormwater runoff.[37] Most of the metals released from roofing materials were found in the dissolved phase; however, both zinc and galvanized steel materials released zinc in particulate form.[38] The study concluded that shingles released the greatest number of pollutants into stormwater.[39] Observed amounts of metals like copper, nickel, and cadmium, as well as organic materials like polycyclic aromatic hydrocarbons (PAHs) and nonylphenols, were found in stormwater running off the material.[40]

---

[33] *Id.*
[34] New Jersey BMP Manual, Chapter 9.3, Dry Wells, *available at* https://www.njstormwater.org/bmp_manual/NJ_SWBMP_9.3.pdf.
[35] 36 N.J.R. 670(a) (Feb. 2, 2004).
[36] A. Andersson Wikström et al., "The Release of Pollutants from Roofing Materials in Laboratory Experiments," Urban Water Engineering, Department of Civil, Environmental and Natural Resources Engineering, Luleå University of Technology (2015), *available at* https://pdfs.semanticscholar.org/f3a9/be3a73175586f52171ce4a9dcc3996eb60fd.pdf.
[37] *Id.*
[38] *Id.*
[39] *Id.*
[40] *Id.*

Beyond rooftops, other types of non-vehicular impervious surfaces contribute pollutants to receiving waters. A stormwater data summary compiled by EPA indicates that sidewalk runoff contains higher levels of fecal coliform than runoff from any other type of surface.[41] Sidewalks also contribute high levels of deicing chemicals to waterways during the winter season.[42] All of these pollutants can harm fish and wildlife populations, kill native vegetation, foul drinking water supplies, and make recreational areas unsafe.[43] Applying the water quality requirements to these surfaces will help ensure that their runoff is treated and that these impacts will be mitigated.

V. Notwithstanding the proposal's shortcomings, we support a new requirement to use green infrastructure—with modifications to DEP's proposed definition and the addition of a loading ratio for BMPs.

Although a green infrastructure requirement in and of itself is insufficient to address New Jersey's stormwater pollution problems, it would still offer certain benefits compared to the traditional stormwater management approaches commonly in use.

As DEP notes in the rule proposal, green infrastructure practices that rely on vegetation to manage runoff provide benefits that traditional stormwater management techniques do not. These co-benefits include better air quality, reduced urban heat island effect, higher property values, increased wildlife habitat, improved community health, and reduced energy usage.[44] We agree with DEP that the widespread adoption of green infrastructure across New Jersey would help make communities healthier and more sustainable. And as DEP notes, green infrastructure is affordable to implement and should not significantly affect developers' costs.

Additionally, establishing green infrastructure as the default stormwater management technique in New Jersey will help ease a future transition to the retention-based approach that must eventually be implemented in order to protect the state's waterways. Green infrastructure BMPs that work via infiltration, evapotranspiration, and reuse can be used to capture runoff and prevent it from leaving the site, and as a result implementing them is the best method for complying with a retention standard. Even if DEP does not adopt such a standard at this time, it will be useful to help engineers and developers become familiar with green infrastructure now so that potential future barriers—like lack of information on performance and cost-effectiveness—will not be an issue when a retention standard is ultimately adopted.

---

[41] U.S. EPA, *Preliminary Data Summary of Urban Storm Water Best Management Practices*, at 4-15 (1999), *available at* https://www3.epa.gov/npdes/pubs/usw_b.pdf.
[42] *See* WEF, "Solving Slick Roads and Salty Streams," https://stormwater.wef.org/2015/03/solving-slick-roads-salty-streams/.
[43] *See* U.S. EPA, *Protecting Water Quality from Urban Runoff*, EPA 841-F-03-00 (2003), *available at* https://www3.epa.gov/npdes/pubs/nps_urban-facts_final.pdf.
[44] *See* U.S. EPA, "Benefits of Green Infrastructure," https://www.epa.gov/green-infrastructure/benefits-green-infrastructure.

However, while we support a requirement to use green infrastructure, it is important that that term be properly defined, and DEP's proposed definition is too broad. The rule proposal defines green infrastructure as "a stormwater management measure that manages stormwater close to its source by: 1. Treating stormwater runoff through infiltration into subsoil; 2. Treating stormwater runoff through filtration by vegetation or soil; or 3. Storing stormwater runoff for reuse." While infiltration into soil (element 1 of the definition) and storage for reuse (element 3) are indeed functions by which green infrastructure works, filtration (element 2), on its own, is not (except to the extent that soil media may be used for filtration in conjunction with the green infrastructure BMP's primary functions).

Rather, *evapotranspiration* is the third mechanism, other than infiltration and reuse, by which green infrastructure BMPs manage stormwater. Evapotranspiration means "loss of water from the soil both by evaporation from the soil surface and by transpiration from the leaves of the plants growing on it."[45] Importantly, it differs from filtration because while filtration ultimately results in the discharge of runoff into a stormwater conveyance and then a receiving water, evapotranspiration does not. Filtering and discharging stormwater—even if the filtration function is performed by vegetation and/or soil—does not meet the goal of green infrastructure to both reduce pollutant loading and control volume. That is why the U.S. EPA's definition of green infrastructure includes evapotranspiration but not filtration: "Green infrastructure practices mimic natural hydrologic processes to reduce the quantity and/or rate of stormwater flows . . . [b]y controlling stormwater runoff through the processes of *infiltration, evapotranspiration, and capture and use* (rainwater harvesting)."[46] Rutgers, too, excludes filtration from its definition: "Green infrastructure is an approach to managing stormwater by infiltrating it in the ground where it is generated using vegetation or porous surfaces, or by capturing it for later reuse."[47] Finally, a federal law passed by Congress last month added a definition of green infrastructure to the Clean Water Act that includes evapotranspiration and excludes filtration: "The term 'green infrastructure' means the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest and reuse, or landscaping to *store*,

[45] Encyclopedia Britannica, "Evapotranspiration," https://www.britannica.com/science/evapotranspiration.
[46] EPA, *Greening CSO Plans: Planning and Modeling Green Infrastructure for Combined Sewer Overflow (CSO Control)*, at 7 (2014), *available at* https://www.epa.gov/sites/production/files/2015-10/documents/greening_cso_plans_0.pdf (emphasis added). *See also* EPA, *Incorporating Green Infrastructure Concepts into Total Maximum Daily Loads (TMDLs)*, at 1 (Oct. 2008), *available at* https://www.epa.gov/sites/production/files/2015-07/documents/2008_12_12_tmdl_stormwater_tmdl_lid_final.pdf ("Green Infrastructure (GI) and Low Impact Development (LID) are terms used to describe stormwater management approaches and practices that can be used to eliminate or reduce urban runoff and pollutant loadings by managing the runoff as close to its sources as possible. A collection of small-scale practices, linked together on a site, is used to reduce the impacts of development and redevelopment activities on water resources by maintaining or replicating the predevelopment hydrology of the site. This is achieved through the onsite *infiltration, evapotranspiration, and/or reuse* of rainwater.").
[47] Rutgers, New Jersey Agricultural Experiment Station, "An Introduction to Green Infrastructure Practices," https://njaes.rutgers.edu/fs1197/.

infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or to surface waters."[48]

DEP should bring its definition of green infrastructure into line with the accepted scientific and regulatory consensus regarding these practices by replacing the second element of the definition with "2. Reducing stormwater runoff through evapotranspiration by vegetation and/or soil." This definition matters even though DEP provides a separate list of specific approved BMPs because the rule proposal provides regulated sites the option of deviating from that list and using "alternative stormwater management measures" that meet the broader definition of green infrastructure.

DEP should also ensure that the list of approved green infrastructure BMPs only includes practices that meet this corrected definition. Specifically, it should only include practices that mimic natural processes to both reduce pollutant loadings and reduce runoff volumes, while also providing the co-benefits of green infrastructure to surrounding communities.

We are concerned by the inclusion of two particular BMPs in DEP's proposed list of accepted green infrastructure practices: dry wells and manufactured treatment devices, neither of which appears on the U.S. EPA's list of green infrastructure BMPs.[49] First, the EPA "does not consider dry wells a green infrastructure practice."[50] This is because, while they reduce stormwater flow rate and volume, they do not provide any treatment or pollution reduction benefits.[51] Because dry wells do not remove pollutants from stormwater before infiltrating it into soils, their use creates a risk of groundwater contamination.[52] Second, manufactured treatment devices work via filtration only, as explained in New Jersey's stormwater BMP manual.[53] As discussed above, filtration of stormwater is not properly considered one of the primary mechanisms that defines green infrastructure practices. Manufactured treatment devices also fail to meet the definition of green infrastructure because they do not rely on soils, vegetation, or anything else that replicates natural systems or makes productive use of rainwater. Neither of these BMPs should be included in the proposed rule's Table 5-1 or Table 5-2 listing approved green infrastructure practices.

In addition, while not specifically listed in DEP's list of approved green infrastructure practices, we are concerned that the proposed definition would encompass the use of subsurface infiltration basins, which are increasingly used for stormwater management in New Jersey. These

---

[48] Water Infrastructure Improvement Act, Pub. L. No. 115-436, sec. 5(a) (enacted Jan. 14, 2019).
[49] U.S. EPA, "What Is Green Infrastructure?", https://www.epa.gov/green-infrastructure/what-green-infrastructure.
[50] EPA, *Green Infrastructure Opportunities and Barriers in the Greater Los Angeles Region*, at 2-3 (Aug. 2013), *available at* https://www.epa.gov/sites/production/files/2015-10/documents/council_watershed_health_gi_report.pdf.
[51] *Id.* at 3.
[52] *See* U.S. EPA, *Getting Up to Speed: Ground Water Contamination*, at C-6, *available at* https://www.epa.gov/sites/production/files/2015-08/documents/mgwc-gwc1.pdf.
[53] New Jersey BMP Manual, Chapter 9.6, Manufactured Treatment Devices, *available at* https://www.njstormwater.org/bmp_manual/NJ_SWBMP_9.6.pdf.

subsurface BMPs are difficult to inspect and maintain, and they provide none of the community co-benefits of other green infrastructure practices. DEP should specify that these subsurface BMPs are not eligible for approval as an alternative stormwater management measure that meets the definition of green infrastructure.

Also critical to the implementation of green infrastructure is the limit established on the contributory drainage area for each type of BMP. Earlier in the stakeholder process for this rulemaking, DEP had suggested that a drainage area limit of 1 acre would be proposed, regardless of the type of BMP used. Now, in this proposal, DEP has deviated from that course and proposed, in 7:8-5.3, a drainage area limit of 1 acre for dry wells (which are not properly considered green infrastructure), but 2.5 acres for some BMPs (small-scale bioretention, small-scale infiltration basins, and small-scale sand filters) and no limit for other BMPs (cisterns, grass swales, green roofs, and vegetative filter strips).

We support the establishment of drainage area limits generally because scientific research has found that distributed BMPs do a better job of mimicking the natural hydrologic cycle than larger centralized BMPs.[54] For example, the U.S. Geological Survey has found that "catchment-wide application of distributed BMPs improve[s] stream hydrology compared to centralized BMPs."[55] However, drainage area limits must be set appropriately. As DEP notes, a 2.5-acre limit on contributory drainage area for bioretention and infiltration BMPs is a larger limit than most other jurisdictions have established, and DEP does not provide a compelling explanation as to why it has chosen to deviate from common practice and set a higher limit that jeopardizes the functioning of these BMPs. DEP should reduce the drainage area limits in the proposed rules, consistent with the best available science and drawing from the approaches used in other jurisdictions. We also disagree with DEP's assertion that a drainage area limit is not applicable for green roofs. DEP states that "they only manage the stormwater that falls directly on the surface of the green roof," but this is factually incorrect, as green roofs can be designed to capture runoff from other areas of the rooftop. (Indeed, this is how the Watershed Institute's green roof is designed.) As a result, it is appropriate to establish a drainage area limit for green roofs. For example, the District of Columbia limits the entire contributing drainage area to a green roof (including the green roof itself) to no more than 25 percent larger than the area of the green roof.[56]

---

[54] *See* Zhang, G., et al., Tetra Tech, "Comparison of Two Stormwater Management Paradigms: Centralized vs. Distributed," Proceedings of the 2007 Pennsylvania Stormwater Management Symposium. Villanova Urban Stormwater Partnership, Villanova, Pennsylvania (2007), *available at* https://owl.cwp.org/mdocs-posts/zhang-et-al-2007-comparison-between-regional-and-distributed-sw-approach/.

[55] J.V. Loperfido et al., "Effects of Distributed and Centralized Stormwater Best Management Practices and Land Cover on Urban Stream Hydrology at the Catchment Scale," *Journal of Hydrology*, Vol. 519, Part C (Nov. 2014), *available at* https://www.sciencedirect.com/science/article/pii/S0022169414005241.

[56] District of Columbia Department of Energy and Environment, Stormwater Management Guidebook, at 3.2.1 (page 30), *available at* https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page_content/attachments/FinalGuidebook_changes%20accepted_Chapters%201-7_07_29_2013_compressed.pdf.

More importantly, the proposed rule's drainage area limits will not be effective at ensuring BMPs function correctly in managing runoff at the source unless they are coupled with a loading ratio. In other words, DEP should establish, for each BMP, a maximum ratio of contributory drainage area to the surface area of the BMP. DEP already proposes to establish such a ratio of 3:1 for pervious paving systems, and its rationale applies to other BMPs as well: if a BMP receives an excessive flow of stormwater runoff, achievement of the rule's stormwater management goals can be negatively impacted. This scenario can occur if a large area drains into a too-small stormwater facility. Establishing a drainage area limit does not itself solve this problem because such a limit does not regulate the size of the BMP in relation to the size of the area draining into it. DEP should establish loading ratios for each type of stormwater management practice to ensure their proper function. We note that Pennsylvania, among other jurisdictions, has taken a similar approach.[57]

A final comment on the proposed green infrastructure requirement: DEP should require that all new green infrastructure BMPs be subject to at least five years of inspections and monitoring to guarantee their continued performance. This requirement would help to ensure the successful rollout of a new stormwater management approach across the state.

VI. We also support other elements of the proposal that would help reduce harmful runoff pollution, subject to certain technical revisions.

There are four proposed changes to the stormwater regulations, beyond the requirement to use green infrastructure, that we support and urge DEP to formally adopt (along with one critical technical revision described below).

First, we support the proposed requirement for deed notices for stormwater management measures. By providing notice of existing stormwater facilities to the new owners of properties that change hands, this requirement would help ensure that BMPs are maintained. As a result, it would be an important step toward addressing the widespread failures of stormwater BMPs seen across New Jersey that have hindered progress toward improving water quality.

Second, we support DEP's attempt to tighten the rules regarding the circumstances when variances from the stormwater management standards are allowed. In order to protect communities from pollution and flooding, variances must be granted as seldom as possible. To meet this goal, DEP proposes to require that applicants demonstrate that full compliance with the rules is technically impracticable, and the proposal states that "technical impracticability exists only when the design and performance standard cannot be met for engineering, environmental, or safety reasons." We strongly agree with the intent behind this proposed change—to ensure that variances are granted only when truly necessary—but we believe the language as written is not strong enough to effectuate that intent. Under this standard of impracticability, a project

[57] *See* Pennsylvania Stormwater BMP Manual, Appendix C, at 15, *available at* http://www.depgreenport.state.pa.us/elibrary/GetFolder?FolderID=4673.

applicant could design a site with a large amount of runoff-generating impervious cover and then argue that it is infeasible to meet the performance standards for "engineering reasons." DEP should revise the proposed standard to avoid creating this loophole. We recommend that DEP adopt the approach taken by the District of Columbia, which requires certain projects eligible for variances to demonstrate technical infeasibility by describing each opportunity that *could be created* by amending the project's site design in order to create an expanded area for stormwater BMPs.[58]

Third, we support the new and clarified requirements for stormwater management in combined sewer areas. In particular, it is critical that the rules' water quality requirement is enforced at sites that drain into combined sewer systems. It also makes sense to allow the use of regional or community basins in combined sewer areas, as long as those basins are properly designed and maintained, as they can achieve important cost savings and open up additional green infrastructure possibilities in densely developed areas.

Fourth, while we continue to believe that the universe of regulated sites must be further expanded to include small sites and redevelopment, we support the current proposal's more limited amendments to the definition of "major development," which will help to capture more projects and thereby reduce the impact of development on local waterways and infrastructure. Specifically, we support the proposal to count all disturbance cumulatively since 2004 to stop developers from phasing projects to avoid the major development threshold.

*

[58] *See* 21 DCMR § 521.5.

Thank you again for the opportunity to offer comments on the proposed rule. We recognize the effort that DEP has put into this proposal, and urge the Department to follow through on these intentions by strengthening the requirements of the rules to effectuate real change. We look forward to engaging with DEP throughout the rulemaking process. Please do not hesitate to contact us with questions.

Sincerely,

Emma Melvin
Delaware Bayshore Program Director
American Littoral Society
emma@littoralsociety.org

Jennifer Coffey
Executive Director
Association of New Jersey Environmental Commissions
jcoffey@anjec.org

Peter Blair
Policy Attorney
Clean Ocean Action
pblair@cleanoceanaction.org

Maya Van Rossum
The Delaware Riverkeeper
Delaware Riverkeeper Network
keepermaya@delawareriverkeeper.org

Doug O'Malley
Executive Director
Environment New Jersey
domalley@environmentnewjersey.org

Bill Sheehan
Riverkeeper and Executive Director
Hackensack Riverkeeper
captain@hackensackriverkeeper.org

Alan Hunt
Executive Director
Musconetcong Watershed Association
alan@musconetcong.org

Rebecca Hammer
Senior Attorney
Natural Resources Defense Council
rhammer@nrdc.org

Jeff Tittel
Chapter Director
New Jersey Chapter of the Sierra Club
jeff.tittel@sierraclub.org

Julia Somers
Executive Director
New Jersey Highlands Coalition
julia@njhighlandscommission.org

Ed Potosnak
Executive Director
New Jersey League of Conservation Voters
ed.potosnak@njlcv.org

Greg Remaud
Baykeeper and CEO
NY/NJ Baykeeper
greg@nynjbaykeeper.org

Jaclyn Rhoads
Assistant Executive Director
Pinelands Preservation Alliance
jaclyn@pinelandsalliance.org

Bill Kibler
Policy Director
Raritan Headwaters
bkibler@raritanheadwaters.org

Britta Wenzel
Executive Director
Save Barnegat Bay
bwenzel@savebarnegatbay.org

Michael Pisauro
Policy Director
The Watershed Institute
mpisauro@thewatershed.org