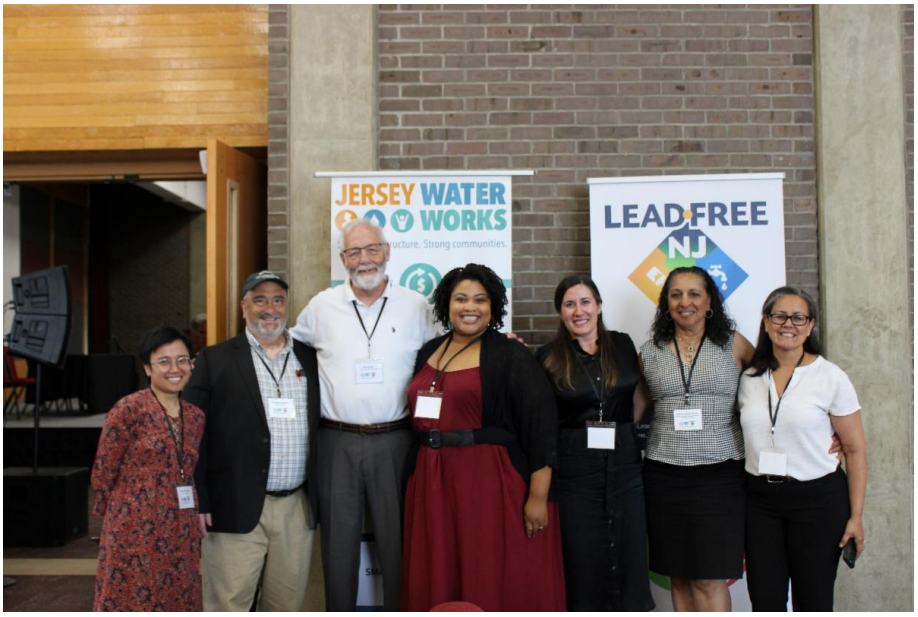
RUTGERS
New Jersey Agricultural Experiment Station

JULY 2023

WATER PAGES eNEWSLETTER

Green Infrastructure: Past, Present, and Future



Jersey Water Works Annual Membership Meeting, July 2023

I was invited by **Jersey Water Works (JWW)** to speak about green infrastructure at their Annual Membership Meeting held at the Rutgers Student Center on College Avenue this month. I was given ten minutes to talk about where we have been and where we are going with regard to green infrastructure. Let me rehash some of my thoughts that I shared with the JWW audience.

First, where we have been. Twenty years ago, when I joined Rutgers, very little green infrastructure was being used in New Jersey. A few municipalities were requiring new developments to install bioretention basins (often viewed as large rain gardens); mostly there were rain garden educational programs that encouraged community groups and homeowners to install rain gardens. There was very little money available for these programs. At that time, NJDEP was skeptical of rain gardens and often giggled at me when I requested funding to do rain garden programs. Bioretention systems were included in the Stormwater Best Management Practices Manual, but these could manage small storms as well as the 100-year storm; basically, big detention basins that were planted with native plants and incorporated an engineered soil designed to quickly infiltrate. In the beginning, there were also rain barrels. The Rutgers Cooperative Extension Water Resources Program

supported build-a-rain barrel workshops across the state. Many of these workshops were being conducted by Americorps Watershed Ambassadors, Rutgers Cooperative Extension County Agents, and watershed groups. While rain barrels do very little for stormwater management, these workshops were an outstanding means of developing environmental stewardship among residents throughout New Jersey. Many of these early rain barrel workshop attendees went on to build rain gardens and became advocates for green infrastructure.

Where we are now is a little different. All major developments are required to use small scale green infrastructure systems (like rain gardens) to treat water quality and promote groundwater recharge, and larger scale green infrastructure systems are to be used to manage the 100-year storm. Green infrastructure is being used in combined sewered communities to reduce stormwater inflow into the combined system to help eliminate combined sewer overflows (CSOs). All the new permits for the CSO communities will require these municipalities to use green infrastructure to manage a portion of the stormwater to reduce the occurrence of CSOs. There are still no requirements to retrofit existing development with green infrastructure, which is currently being completed on a voluntary basis with mostly grant funding supporting the effort.

What does the future hold? The future holds lots more green infrastructure to manage small storms and coupling green infrastructure with gray infrastructure storage systems to manage larger climate change extreme events to retrofit existing development. In the future, municipalities will be required to install green infrastructure to manage stormwater in developed areas where currently no stormwater management exists. This will most like be required by the New Jersey Department of Environmental Protection (NJDEP) through the municipal separate storm sewer system (MS4) permits. Basically, the watershed improvement plans that municipalities are required to develop under the current MS4 permits will be implemented under the next revision of the MS4 permit; this will drive the installation of green infrastructure. Another possibility is that NJDEP will use the "Additional Measures" option of the MS4 permit and simply require municipalities to install green infrastructure to achieve US Environmental Protection Agency (USEPA) approved total maximum daily load (TMDL) reductions. In the future, funding mechanisms will need to be put in place to support the installation of green infrastructure. Stormwater utilities will be one option or municipalities will just include funding in their annual budget that is dedicated to installing green infrastructure. Woodbridge Township has been doing this for the last several years. Either way, the reliance on grant funding to install green infrastructure will not be adequate to meet green infrastructure goals. Finally, a large workforce development program will occur that trains landscape professionals and public works employees on how to install and maintain green infrastructure. Construction is a big driver of New Jersey's economy. As the construction of new homes and warehouses slows in the future, the construction of green infrastructure to protect our waterways, our residents, and our property will replace the build of new homes and grow New Jersey's economy.

~ Christopher C. Obropta, Ph.D., P.E., Extension Specialist in Water Resources

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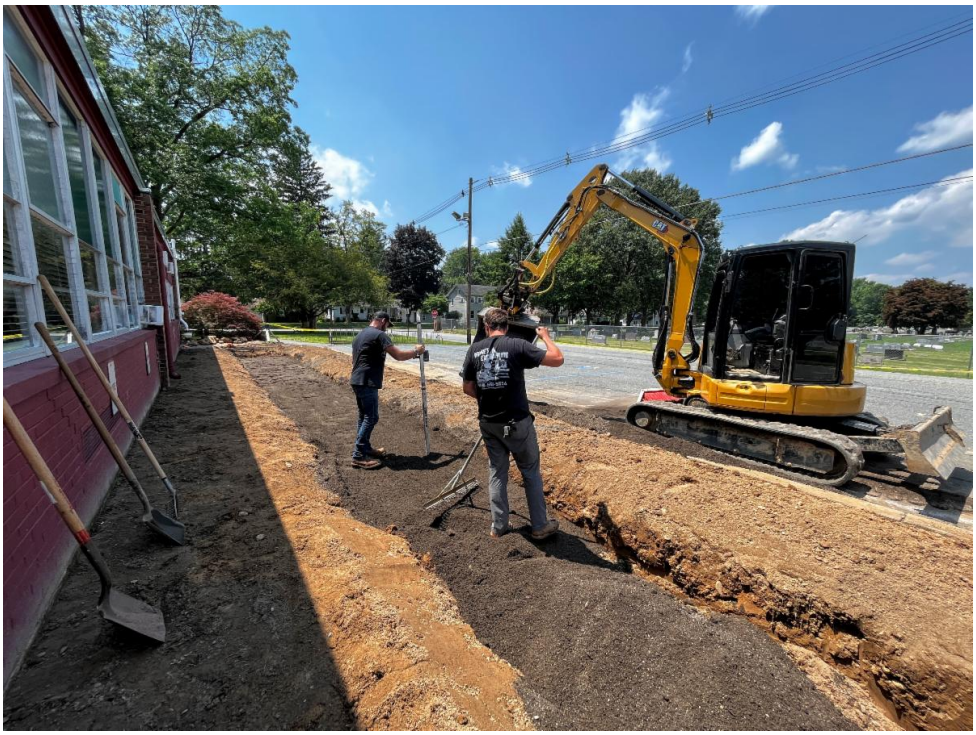
Three More Rain Gardens in the New Jersey Highlands (Belvidere, Hackettstown, and Hope)

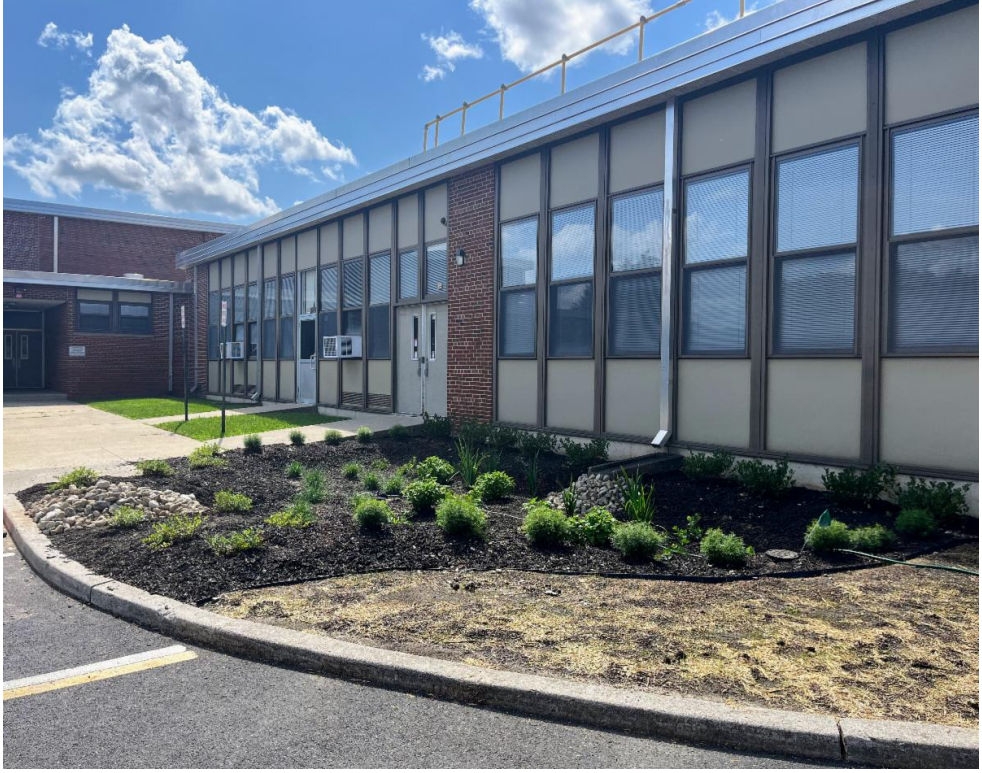
Rain gardens were built this summer at Hope Township School, Hackettstown High School, and Belvidere Elementary School, joining a long list of New Jersey schools with rain gardens, including projects recently installed at Hackettstown Middle School and Pope John High School in Sparta. These gardens were installed as part of a green stormwater infrastructure initiative and are designed to manage stormwater runoff from impervious surfaces and create wildlife habitat in the Upper Delaware River watershed and Highlands Planning Area.

Belvidere Elementary School was the latest to receive an 885 sq. ft. rain garden to manage stormwater runoff and create wildlife habitat in the Upper Delaware River watershed. This rain garden takes runoff from the building's rooftop, totaling 6,590 sq. ft. of impervious surface and managing approximately 136,600 gallons annually. The Water Resources Program provided the design, and local excavator, Drake's Excavating, constructed the rain garden. Volunteers from the community and Belvidere Environmental Commission planted native perennials and shrubs, beautifying the school and creating new habitat for pollinator species. Funding for this project was provided by the Water Resources Program through a grant from the National Fish and Wildlife Foundation.



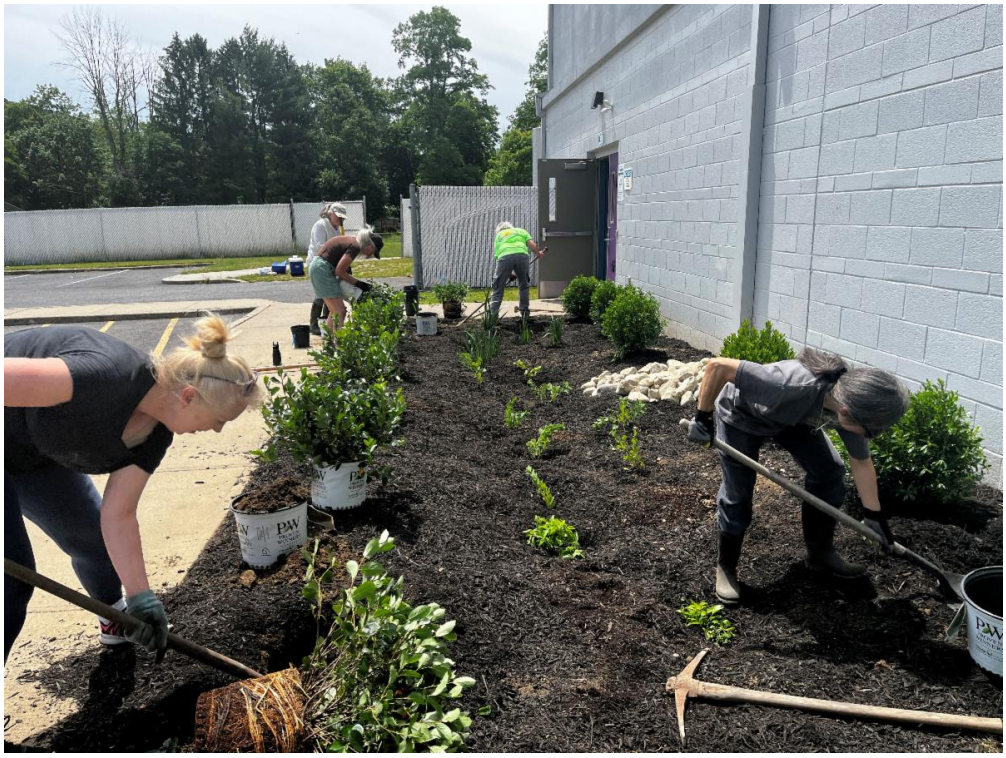
Drake's Excavating constructing a rain garden at Belvidere Elementary School
[Photo credit: Chris Perez, Water Resources Program]

A 265 sq. ft. rain garden was installed at Hackettstown High School to manage stormwater runoff and create wildlife habitat in the Upper Delaware River watershed. The Water Resources Program provided the design and local excavator, H. Burd and Sons Excavating, constructed the rain garden with assistance from the Hackettstown Municipal Utility Authority and the Hackettstown School District. The Water Resources Program staff and student interns planted native perennials and shrubs, beautifying the school and creating new habitat for pollinator species. Funding for this project was provided by the Water Resources Program through a grant from the National Fish and Wildlife Foundation.



Completed rain garden at Hackettstown High School
[Photo credit: Carl Johnson, Hackettstown Board of Education]

Students and local volunteers rallied together to build a 450 sq. ft. rain garden at the Hope Township School to manage stormwater runoff and create wildlife habitat in the Upper Delaware River watershed. The Water Resources Program provided the design, and a local excavator, Drake's Excavating, donated their time to construct the rain garden with assistance from the Hope Township Department of Public Works. The Water Resources Program staff, Hope Township Green Team, school staff, and community volunteers planted native perennials and shrubs, beautifying the school and creating new habitat for pollinator species. Funding for this project was provided by the Water Resources Program through a grant from the National Fish and Wildlife Foundation.



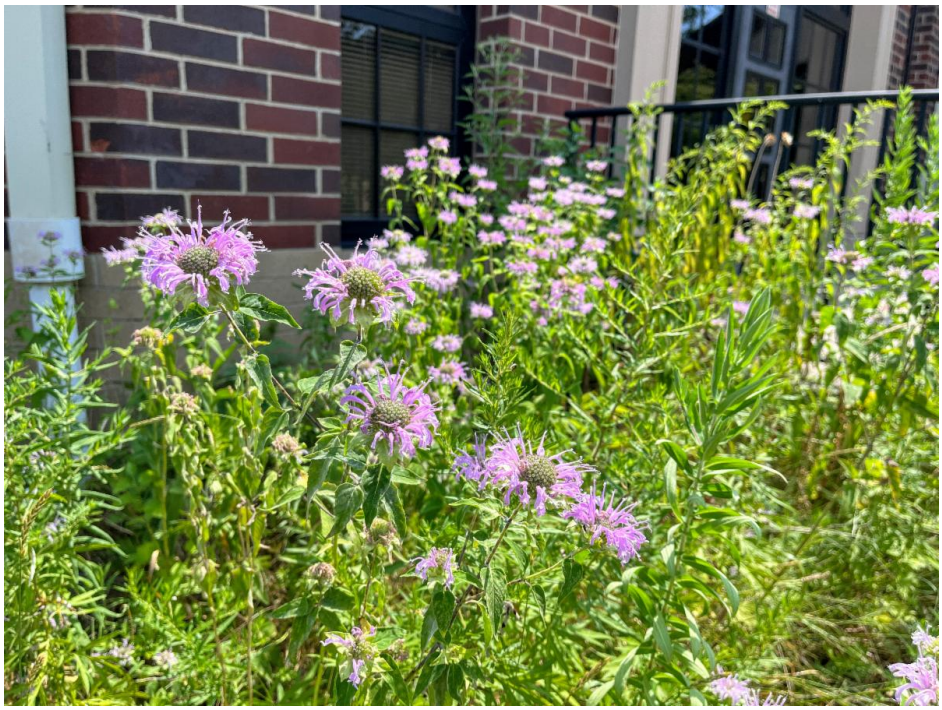
Volunteers planting at Hope Township School
[Photo credit: Chris Perez, Water Resources Program]

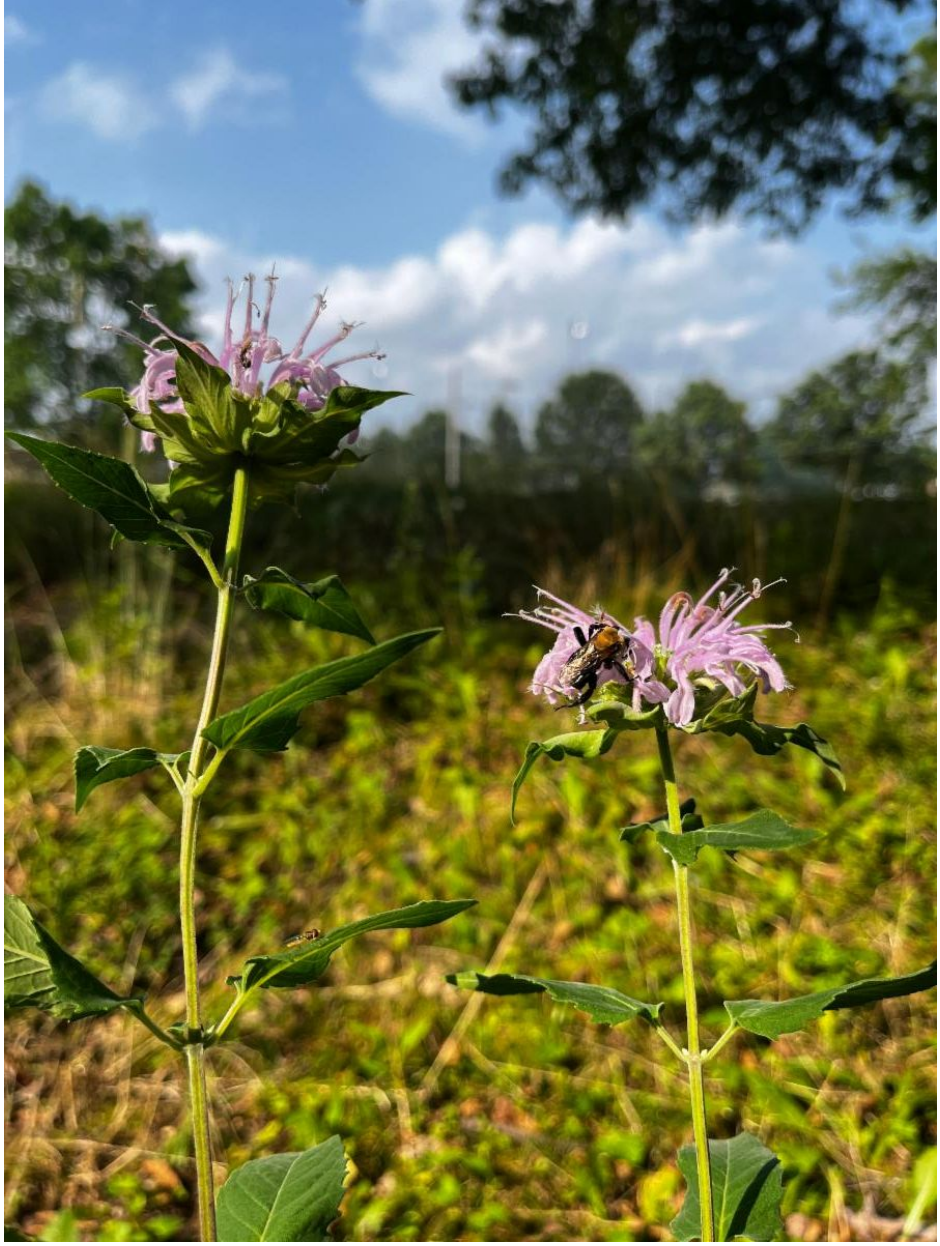
Rain Garden Native Plant Spotlight ~ Wild Bergamot/Bee Balm (*Monarda fistulosa*)

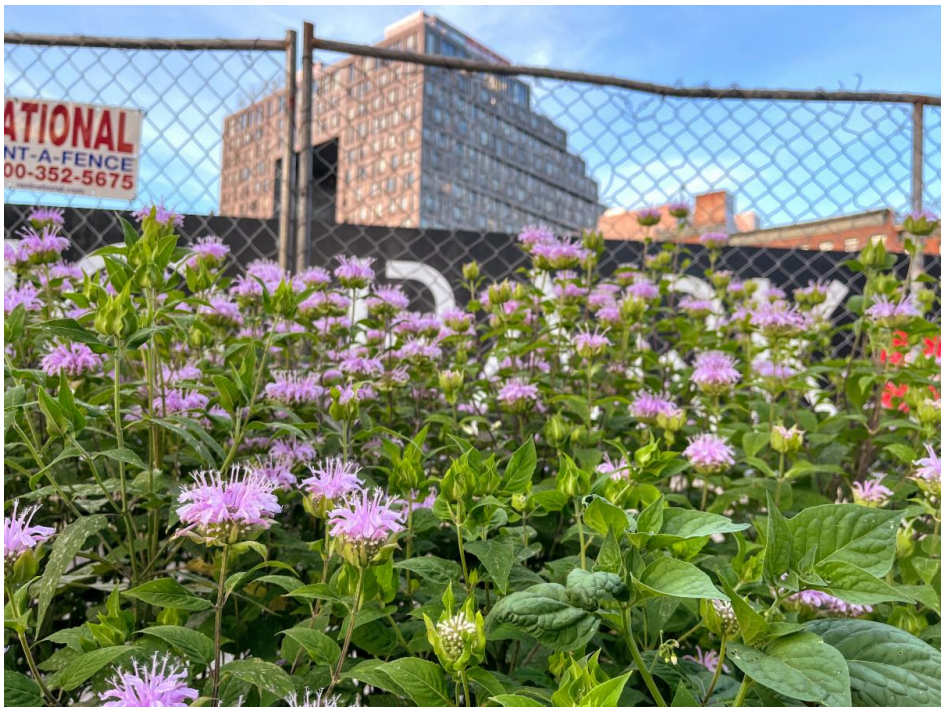
Wild Bergamot or Bee Balm is a 2'-4' summer flowering perennial that excels both in rain gardens and naturalized settings. Adaptable to locations with full sun to part shade, *Monarda fistulosa* is also tolerant of a wide range of soil types, including the well-draining soils of a rain garden. As the name suggests, the light purple flowers are attractive to bees and other pollinators, and the showy flowers can be had in red, white, and pink in other *Monarda* species and cultivars.

For more information:

Jersey-Friendly Yards
https://www.jerseyyards.org/plant/monarda-fistulosa/







***Monarda fistulosa*, Bee Balm**
[Photo credit: Chris Perez, RCE Water Resources Program]

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