



**Impervious Cover Assessment  
for  
City of Bridgeton, Cumberland County, New Jersey**

*Prepared for City of Bridgeton by the  
Rutgers Cooperative Extension Water Resources Program*

October 21, 2016



## **Introduction**

Pervious and impervious are terms that are used to describe the ability or inability of water to flow through a surface. When rainfall hits a surface, it can soak into the surface or flow off the surface. Pervious surfaces are those which allow stormwater to readily soak into the soil and recharge groundwater. When rainfall drains from a surface, it is called "stormwater" runoff (Figure 1). An impervious surface can be any material that has been placed over soil that prevents water from soaking into the ground. Impervious surfaces include paved roadways, parking lots, sidewalks, and rooftops. As impervious areas increase, so does the volume of stormwater runoff.



Figure 1: Stormwater draining from a parking lot

New Jersey has many problems due to stormwater runoff, including:

- **Pollution**: According to the 2010 New Jersey Water Quality Assessment Report, 90% of the assessed waters in New Jersey are impaired, with urban-related stormwater runoff listed as the most probable source of impairment (USEPA, 2013). As stormwater flows over the ground, it picks up pollutants including animal waste, excess fertilizers, pesticides, and other toxic substances. These pollutants are then able to enter waterways.
- **Flooding**: Over the past decade, the state has seen an increase in flooding. Communities around the state have been affected by these floods. The amount of damage caused has also increased greatly with this trend, costing billions of dollars over this time span.

- Erosion: Increased stormwater runoff causes an increase in the velocity of flows in our waterways. The increased velocity after storm events erodes stream banks and shorelines, degrading water quality. This erosion can damage local roads and bridges and cause harm to wildlife.

The primary cause of the pollution, flooding, and erosion problems is the quantity of impervious surfaces draining directly to local waterways. New Jersey is one of the most developed states in the country. Currently, the state has the highest percent of impervious cover in the country at 12.1% of its total area (Nowak & Greenfield, 2012). Many of these impervious surfaces are directly connected to local waterways (i.e., every drop of rain that lands on these impervious surfaces ends up in a local river, lake, or bay without any chance of being treated or soaking into the ground). To repair our waterways, reduce flooding, and stop erosion, stormwater runoff from impervious surfaces has to be better managed. Surfaces need to be disconnected with green infrastructure to prevent stormwater runoff from flowing directly into New Jersey's waterways. Disconnection redirects runoff from paving and rooftops to pervious areas in the landscape.

Green infrastructure is an approach to stormwater management that is cost-effective, sustainable, and environmentally friendly. Green infrastructure projects capture, filter, absorb, and reuse stormwater to maintain or mimic natural systems and to treat runoff as a resource. As a general principal, green infrastructure practices use soil and vegetation to recycle stormwater runoff through infiltration and evapotranspiration. When used as components of a stormwater management system, green infrastructure practices such as bioretention, green roofs, porous pavement, rain gardens, and vegetated swales can produce a variety of environmental benefits. In addition to effectively retaining and infiltrating rainfall, these technologies can simultaneously help filter air pollutants, reduce energy demands, mitigate urban heat islands, and sequester carbon while also providing communities with aesthetic and natural resource benefits (USEPA, 2013).

The first step to reducing the impacts from impervious surfaces is to conduct an impervious cover assessment. This assessment can be completed on different scales: individual lot, municipality, or watershed. Impervious surfaces need to be identified for stormwater management. Once impervious surfaces have been identified, there are three steps to better manage these surfaces.

1. ***Eliminate surfaces that are not necessary.*** For example, a paved courtyard at a public school could be converted to a grassed area.
2. ***Reduce or convert impervious surfaces.*** There may be surfaces that are required to be hardened, such as roadways or parking lots, but could be made smaller and still be functional. A parking lot that has two-way car ways could be converted to one-way car ways. There also are permeable paving materials such as porous asphalt, pervious concrete, or permeable paving stones that could be substituted for impermeable paving materials (Figure 2).
3. ***Disconnect impervious surfaces from flowing directly to local waterways.*** There are many ways to capture, treat, and infiltrate stormwater runoff from impervious surfaces. Opportunities may exist to reuse this captured water.



Figure 2: Rapid infiltration of water through porous pavement is demonstrated at the USEPA Edison New Jersey test site

### **City of Bridgeton Impervious Cover Analysis**

Located in Cumberland County in southern New Jersey, the City of Bridgeton is approximately 6 miles in size. Figures 3 and 4 illustrate that the City of Bridgeton is dominated by urban land uses. A total of 65.4% of the municipality's land use is classified as urban. Of the urban land in the City of Bridgeton, medium density residential is the dominant land use (Figure 5).

The literature suggests a link between impervious cover and stream ecosystem impairment starting at approximately 10% impervious surface cover (Schueler, 1994; Arnold and Gibbons, 1996; May et al., 1997). Impervious cover may be linked to the quality of lakes, reservoirs, estuaries, and aquifers (Caraco et al., 1998), and the amount of impervious cover in a watershed can be used to project the current and future quality of streams. Based on the scientific literature, Caraco et al. (1998) classified urbanizing streams into the following three categories: sensitive streams, impacted streams, and non-supporting streams. Sensitive streams typically have a watershed impervious surface cover from 0 – 10%. Impacted streams have a watershed impervious cover ranging from 11-25% and typically show clear signs of degradation from urbanization. Non-supporting streams have a watershed impervious cover of greater than 25%; at this high level of impervious cover, streams are simply conduits for stormwater flow and no longer support a diverse stream community.

The New Jersey Department of Environmental Protection's (NJDEP) 2012 land use/land cover geographical information system (GIS) data layer categorizes the City of Bridgeton into many unique land use areas, assigning a percent impervious cover for each delineated area. These impervious cover values were used to estimate the impervious coverage for the City of Bridgeton. Based upon the 2012 NJDEP land use/land cover data, approximately 26.4% of the City of Bridgeton has impervious cover. This level of impervious cover suggests that the streams in the City of Bridgeton are likely non-supporting streams.

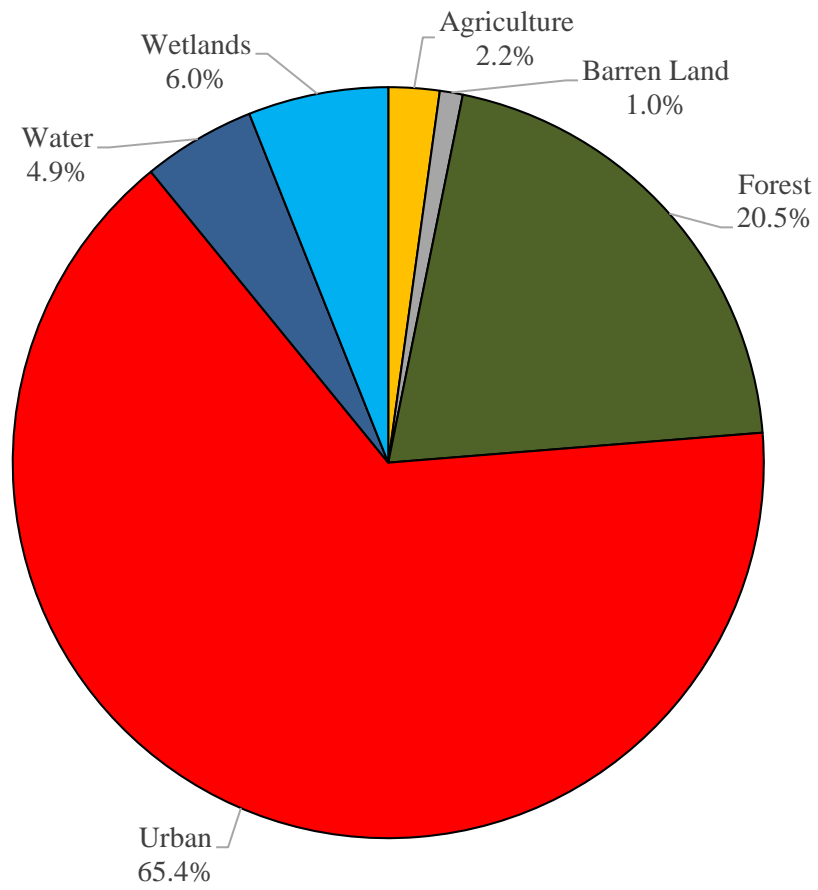


Figure 3: Pie chart illustrating the land use in City of Bridgeton

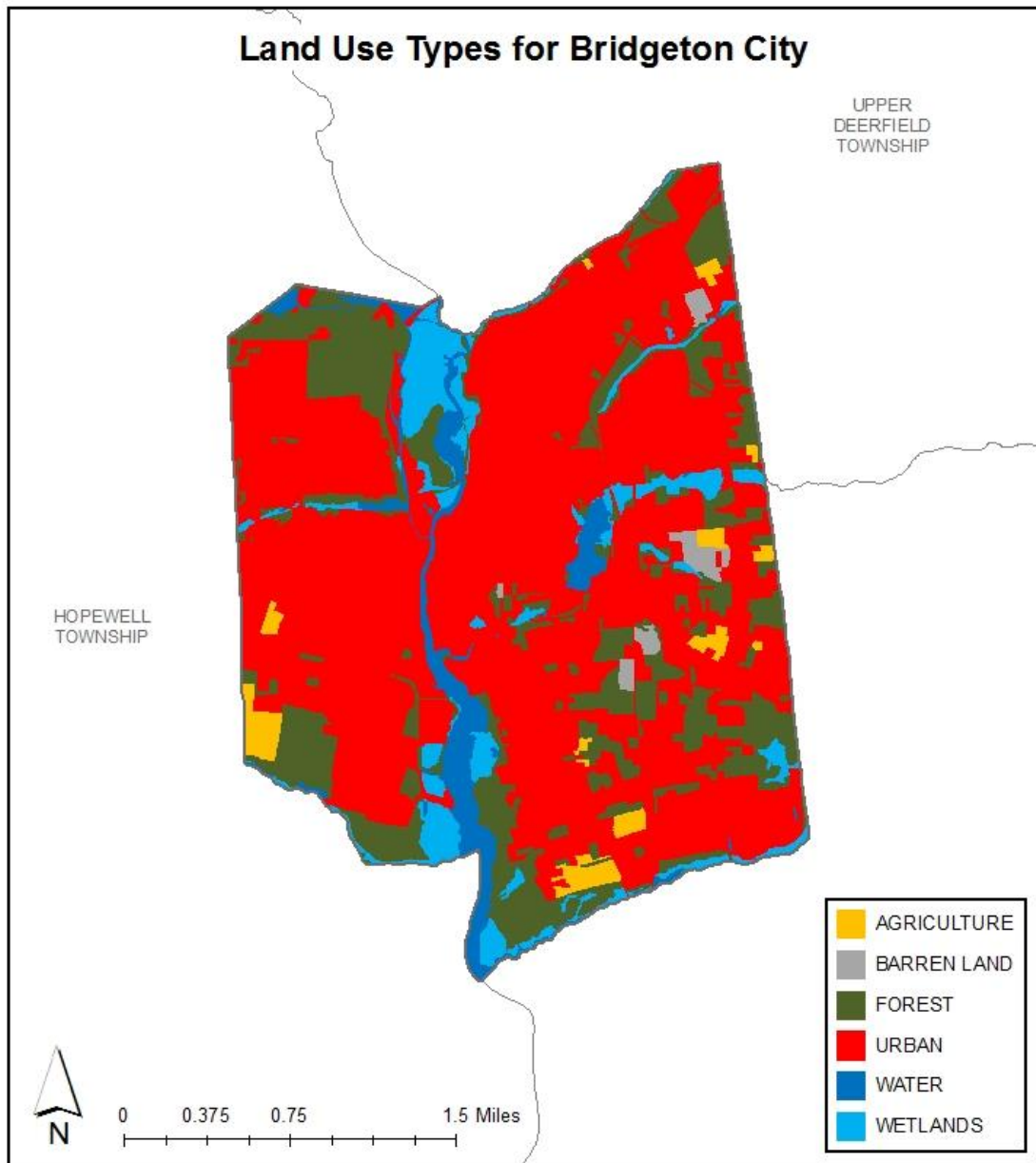


Figure 4: Map illustrating the land use in City of Bridgeton



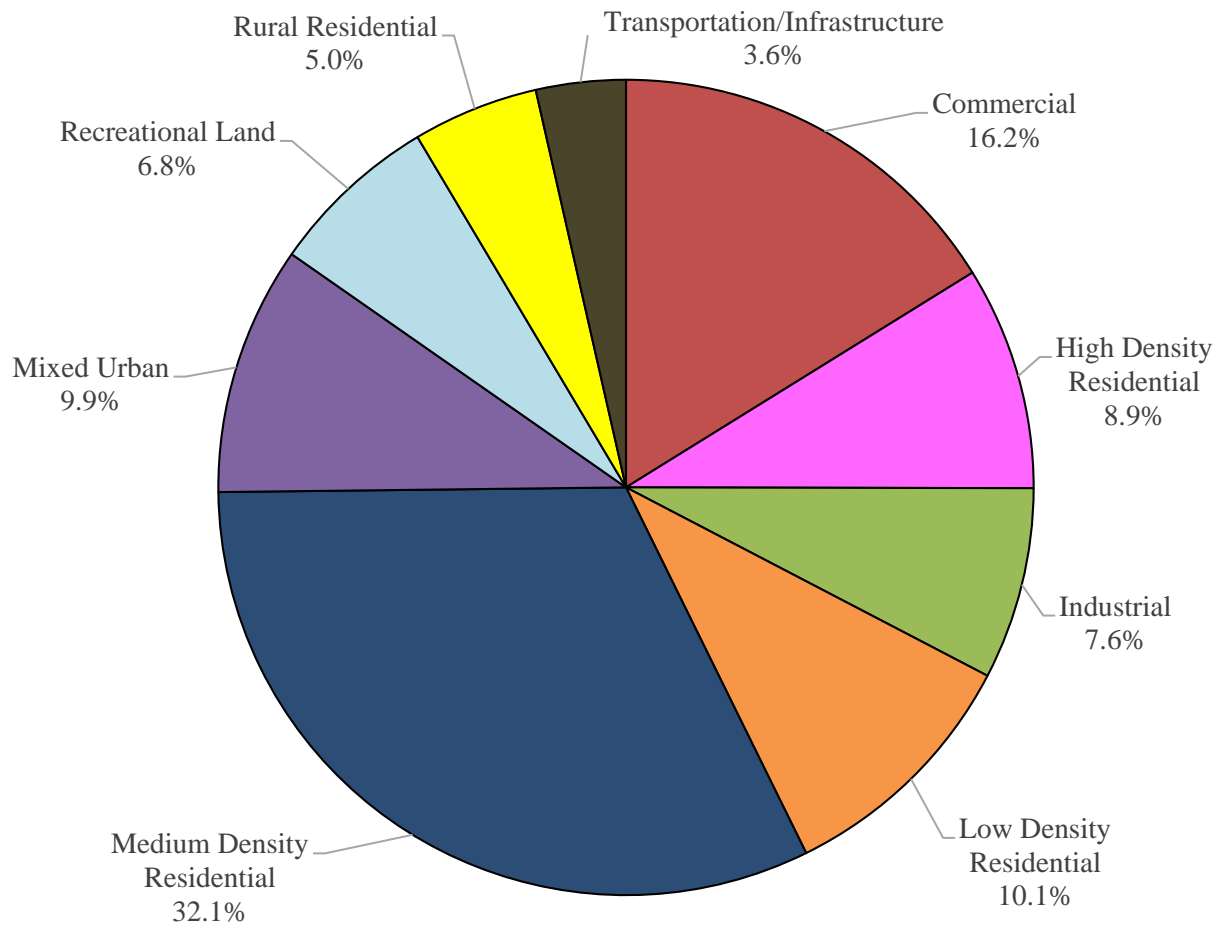


Figure 5: Pie chart illustrating the various types of urban land use in City of Bridgeton

Water resources are typically managed on a watershed/subwatershed basis; therefore an impervious cover analysis was performed for each subwatershed within the City of Bridgeton (Table 1 and Figure 6). On a subwatershed basis, impervious cover ranges from 16.5% in the Barrett Run subwatershed to 27.9% in the Indian Fields Branch/Jackson Run subwatershed. Evaluating impervious cover on a subwatershed basis allows the municipality to focus impervious cover reduction or disconnection efforts in the subwatersheds where frequent flooding occurs.

In developed landscapes, stormwater runoff from parking lots, driveways, sidewalks, and rooftops flows to drainage pipes that feed the sewer system. The cumulative effect of these impervious surfaces and thousands of connected downspouts reduces the amount of water that can infiltrate into soils and greatly increases the volume and rate of runoff that flows to waterways. Stormwater runoff volumes (specific to the City of Bridgeton, Cumberland County) associated with impervious surfaces were calculated for the following storms: the New Jersey water quality design storm of 1.25 inches of rain, an annual rainfall of 44 inches, the 2-year design storm (3.3 inches of rain), the 10-year design storm (5.1 inches of rain), and the 100-year design storm (8.8 inches of rain). These runoff volumes are summarized in Table 2. A substantial amount of rainwater drains from impervious surfaces in City of Bridgeton. For example, if the stormwater runoff from one water quality storm (1.25 inches of rain) in the Cohansey River subwatershed was harvested and purified, it could supply water to 236 homes for a year<sup>1</sup>.

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<sup>1</sup> Assuming 300 gallons per day per home

Table 1: Impervious cover analysis by subwatershed for City of Bridgeton

Subwatershed	Total Area		Land Use Area		Water Area		Impervious Cover		
	(ac)	(mi <sup>2</sup> )	(ac)	(mi <sup>2</sup> )	(ac)	(mi <sup>2</sup> )	(ac)	(mi <sup>2</sup> )	(%)
Barrett Run	123.0	0.19	115.8	0.18	7.2	0.01	19.1	0.03	16.5%
Cohansey River	2705.6	4.23	2540.4	3.97	165.2	0.26	661.4	1.03	26.0%
Indiand Fields Branch/Jackson Run	1328.5	2.08	1298.7	2.03	29.8	0.05	362.6	0.57	27.9%
Total	4157.1	6.50	3955.0	6.18	202.2	0.32	1043.0	1.63	26.4%

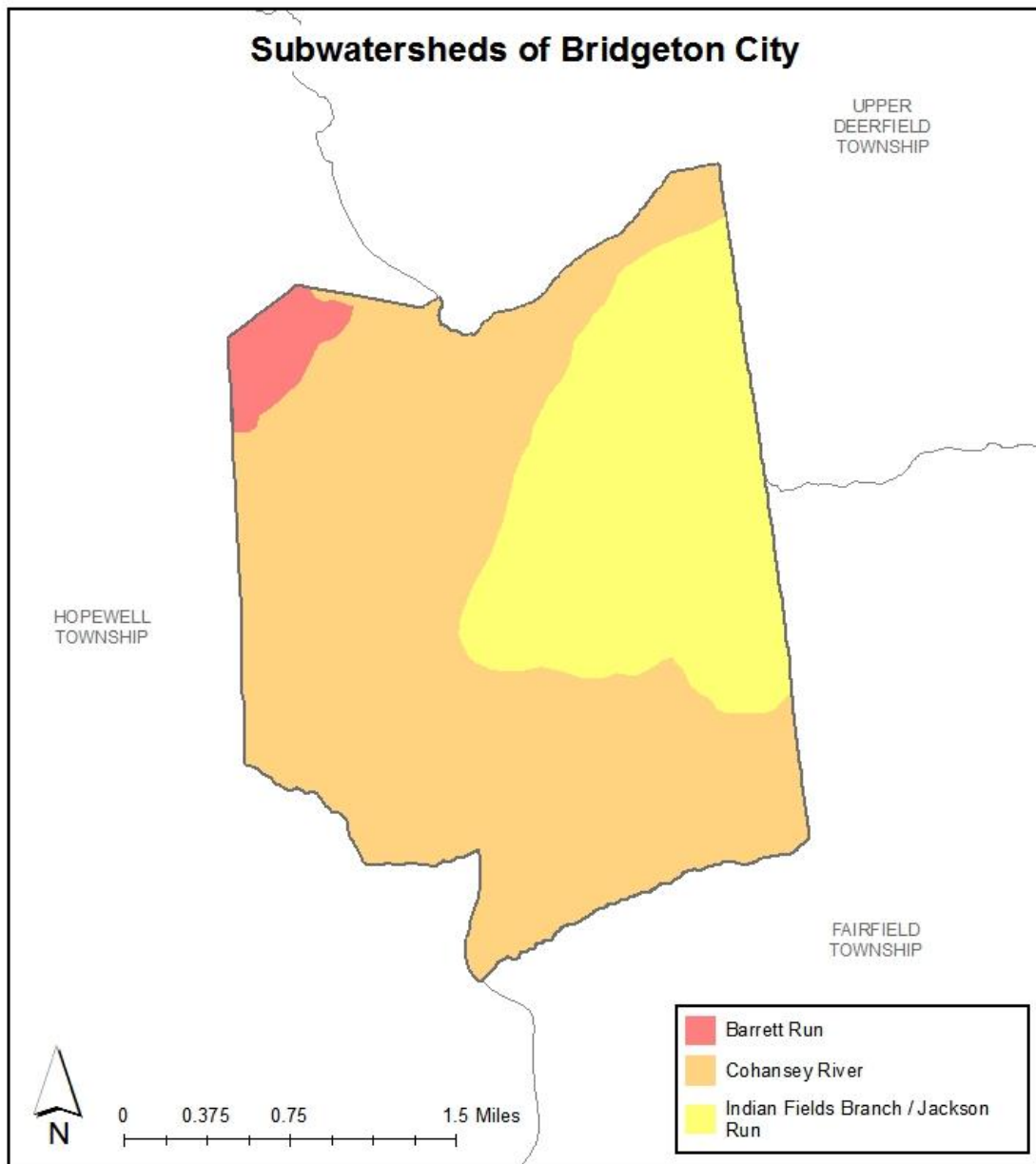


Figure 6: Map of the subwatersheds in City of Bridgeton

Table 2: Stormwater runoff volumes from impervious surfaces by subwatershed in City of Bridgeton

<b>Subwatershed</b>	<b>Total Runoff Volume for the 1.25" NJ Water Quality Storm (MGal)</b>	<b>Total Runoff Volume for the NJ Annual Rainfall of 44" (MGal)</b>	<b>Total Runoff Volume for the 2-Year Design Storm (3.3") (MGal)</b>	<b>Total Runoff Volume for the 10-Year Design Storm (5.1") (MGal)</b>	<b>Total Runoff Volume for the 100-Year Design Storm (8.8") (MGal)</b>
Barrett Run	1.4	49.0	3.7	5.7	9.8
Cohansey River	25.9	911.9	68.4	105.7	182.4
Indian Fields Branch/Jackson Run	15.9	559.5	42.0	64.8	111.9
Total	43.2	1,520	114.0	176.2	304.1

The next step is to set a reduction goal for impervious area in each subwatershed. Based upon the Rutgers Cooperative Extension (RCE) Water Resources Program's experience, a 10% reduction would be a reasonably achievable reduction for these subwatersheds in City of Bridgeton. While it may be difficult to eliminate paved areas or replace paved areas with permeable pavement, it is relatively easy to identify impervious surfaces that can be disconnected using green infrastructure practices. For all practical purposes, disconnecting an impervious surface from a storm sewer system or a water body is an "impervious area reduction." The RCE Water Resources Program recommends that all green infrastructure practices that are installed to disconnect impervious surfaces should be designed for the 2-year design storm (3.3 inches of rain over 24-hours). Although this results in management practices that are slightly over-designed by NJDEP standards, which require systems to be designed for the New Jersey water quality storm (1.25 inches of rain over 2-hours), these systems will be able to handle the increase in storm intensities that are expected to occur due to climate change. By designing these management practices for the 2-year design storm, these practices will be able to manage 95% of the annual rainfall volume. The recommended annual reductions in runoff volumes are shown in Table 3.

As previously mentioned, once impervious surfaces have been identified, the next steps for managing impervious surfaces are to 1) eliminate surfaces that are not necessary, 2) reduce or convert impervious surfaces to pervious surfaces, and 3) disconnect impervious surfaces from flowing directly to local waterways.

### **Elimination of Impervious Surfaces**

One method to reduce impervious cover is to "depave." Depaving is the act of removing paved impervious surfaces and replacing them with pervious soil and vegetation that will allow for the infiltration of rainwater. Depaving leads to the re-creation of natural space that will help reduce flooding, increase wildlife habitat, and positively enhance water quality as well as beautify neighborhoods. Depaving also can bring communities together around a shared vision to work together to reconnect their neighborhood to the natural environment.

Table 3: Impervious cover reductions by subwatershed in City of Bridgeton

<b>Subwatershed</b>	<b>Recommended Impervious Area Reduction (10%) (ac)</b>	<b>Annual Runoff Volume Reduction<sup>2</sup> (MGal)</b>
Cohansey River	76.3	86.6
Indian Fields Branch/Jackson Run	46.8	53.1
Barrett Run	4.1	4.7
Total	127.3	144.4

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<sup>2</sup> Annual Runoff Volume Reduction =

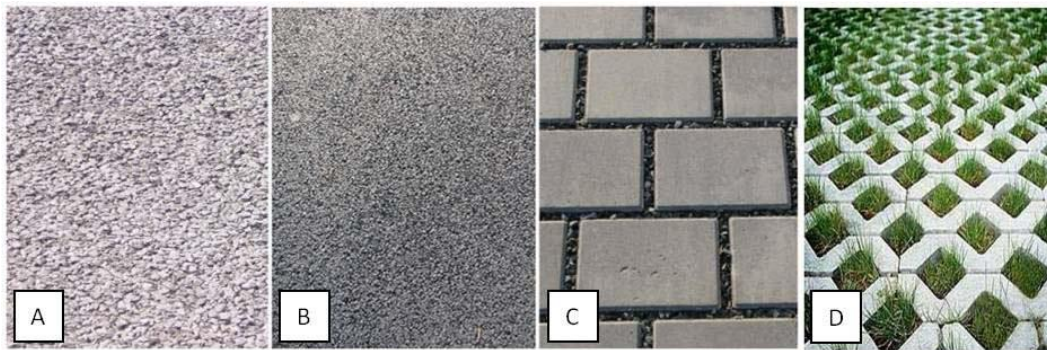
Acres of impervious cover x 43,560 ft<sup>2</sup>/ac x 44 in x (1 ft/12 in) x 0.95 x (7.48 gal/ft<sup>3</sup>) x (1 MGal/1,000,000 gal)

All green infrastructure should be designed to capture the first 3.3 inches of rain from each storm. This would allow the green infrastructure to capture 95% of the annual rainfall of 44 inches.

## **Pervious Pavement**

There are four different types of permeable pavement systems that are commonly being used throughout the country to reduce the environmental impacts from impervious surfaces. These surfaces include pervious concrete, porous asphalt, interlocking concrete pavers, and grid pavers.

*“Permeable pavement is a stormwater drainage system that allows rainwater and runoff to move through the pavement’s surface to a storage layer below, with the water eventually seeping into the underlying soil. Permeable pavement is beneficial to the environment because it can reduce stormwater volume, treat stormwater water quality, replenish the groundwater supply, and lower air temperatures on hot days (Rowe, 2012).”*



*Permeable surfaces: (A) pervious concrete, (B) porous asphalt, (C) interlocking concrete pavers, (D) grid pavers (Rowe, 2012)*

Pervious concrete and porous asphalt are the most common of the permeable surfaces. They are similar to regular concrete and asphalt but without the fine materials. This allows water to quickly pass through the material into an underlying layered system of stone that holds the water, allowing it to infiltrate into the underlying uncompacted soil.

## **Impervious Cover Disconnection Practices**

By redirecting runoff from paving and rooftops to pervious areas in the landscape, the amount of directly connected impervious area in a drainage area can be greatly reduced. There are many cost-effective ways to disconnect impervious surfaces from local waterways.

- Simple Disconnection: This is the easiest and least costly method to reduce stormwater runoff for smaller storm events. Instead of piping rooftop runoff to the street where it enters the catch basin and is piped to the river, the rooftop runoff is released onto a grassed



area to allow the water to be filtered by the grass and soak into the ground. A healthy lawn typically can absorb the first one to two inches of stormwater runoff from a rooftop. Simple disconnection also can be used to manage stormwater runoff from paved areas. Designing a parking lot or driveway to drain onto a grassed area, instead of the street, can dramatically reduce pollution and runoff volumes.

- Rain Gardens: Stormwater can be diverted into shallow landscaped depressed areas (i.e., rain gardens) where the vegetation filters the water, and it is allowed to soak into the ground. Rain gardens, also known as bioretention systems, come in all shapes and sizes and can be designed to disconnect a variety of impervious surfaces (Figure 7).



Figure 7: Rain garden outside the RCE of Gloucester County office which was designed to disconnect rooftop runoff from the local storm sewer system

- Rainwater Harvesting: Rainwater harvesting includes the use of rain barrels and cisterns (Figures 8a and 8b). These can be placed below downspouts to collect rooftop runoff. The collected water has a variety of uses including watering plants and washing cars. This practice also helps cut down on the use of potable water for nondrinking purposes. It is important to divert the overflow from the rainwater harvesting system to a pervious area.



Figure 8a: Rain barrel used to disconnect a downspout with the overflow going to a flower bed



Figure 8b: A 5,000 gallon cistern used to disconnect the rooftop of the Department of Public Works in Clark Township to harvest rainwater for nonprofit car wash events

### **Examples of Opportunities in the City of Bridgeton**

To address the impact of stormwater runoff from impervious surfaces the next step is to identify opportunities in the municipality for eliminating, reducing, or disconnecting directly connected impervious surfaces. To accomplish this task, an impervious cover reduction action plan should be prepared. Aerial photographs are used to identify sites with impervious surfaces in the municipality that may be suitable for inclusion in the action plan. After sites are identified, site visits are conducted to photo-document all opportunities and evaluate the feasibility of eliminating, reducing, or disconnecting directly connected impervious surfaces. A brief description of each site discussing the existing conditions and recommendations for treatment of the impervious surfaces is developed. After a number of sites have been selected for inclusion in the action plan, concept plans and detailed green infrastructure information sheets are prepared for a selection of representative sites.

For the City of Bridgeton, three sites have been included in this assessment. Examples of concept plans and detailed green infrastructure information sheets are provided in Appendix A. The detailed green infrastructure information sheets describe existing conditions and issues, proposed solutions, anticipated benefits, possible funding sources, potential partners and stakeholders, and estimated costs. Additionally, each project has been classified as a mitigation opportunity for recharge potential, total suspended solids removal, and stormwater peak reduction. Finally, these detailed green infrastructure information sheets provide an estimate of gallons of stormwater captured and treated per year by each proposed green infrastructure practice. The concept plans provide an aerial photograph of the site and details of the proposed green infrastructure practices.

### **Conclusions**

The City of Bridgeton can reduce flooding and improve its waterways by better managing stormwater runoff from impervious surfaces. This impervious cover assessment is the first step toward better managing stormwater runoff. The next step is to develop an action plan to eliminate, reduce, or disconnect impervious surfaces where possible and practical. Many of the highly effective disconnection practices are inexpensive. The entire community can be engaged in implementing these disconnection practices.

## **References**

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## **Appendix A**

### **Examples of Impervious Cover Reduction Action Plan Projects Concept Plans and Detailed Green Infrastructure Information Sheets**



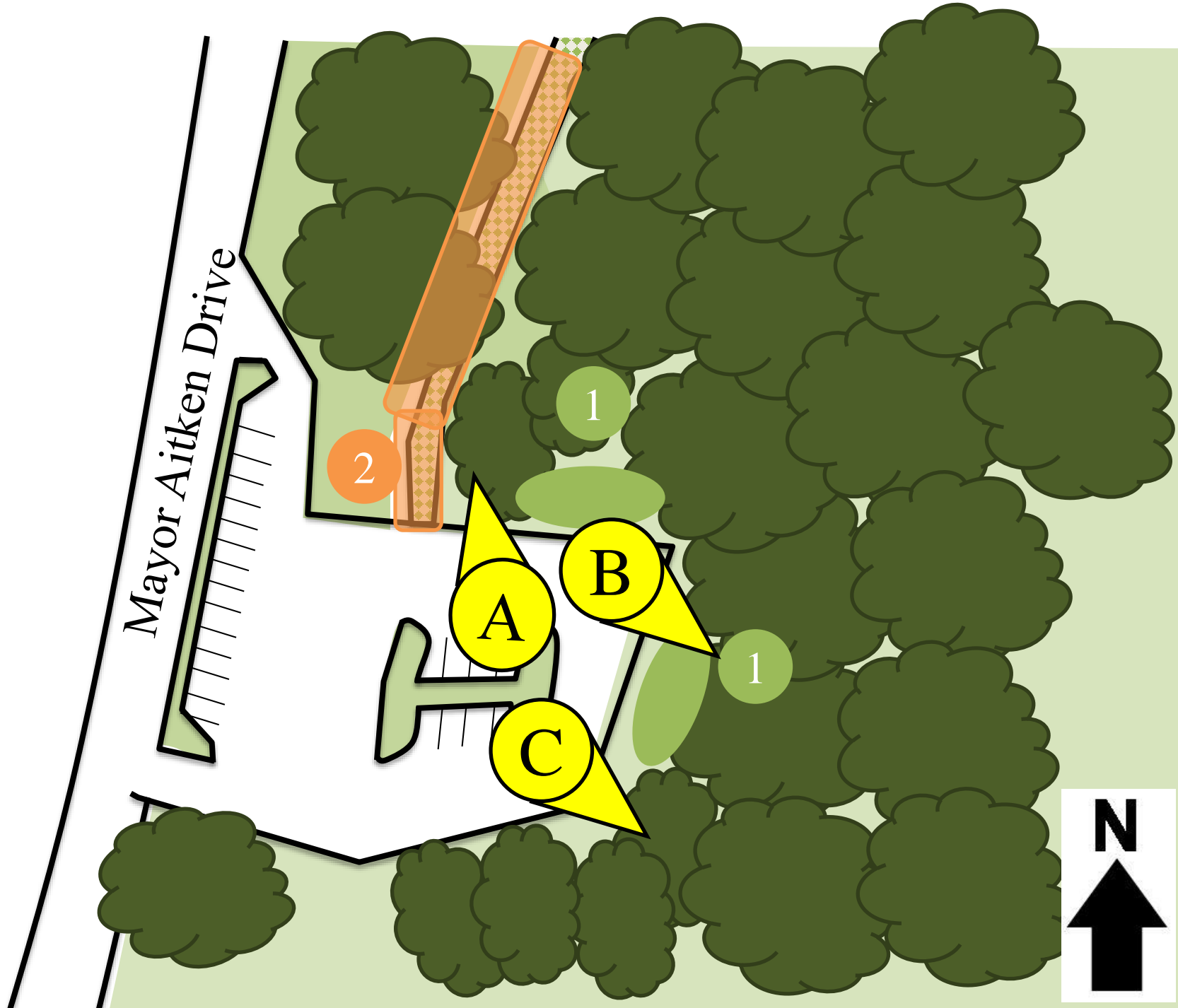
City of Bridgeton  
Impervious Cover Assessment  
*Cohanzyck Zoo, 45 Mayor Aitken Drive*



PROJECT LOCATION:



SITE PLAN:



- 1 BIORETENTION SYSTEM:** Bioretention systems can reduce sediment and nutrient loading to the local waterway and increase groundwater recharge. Two bioretention systems could be installed at the edge of the parking lot to capture, treat, and infiltrate the stormwater runoff.
- 2 POROUS PAVEMENT:** Porous pavement could be installed to infiltrate runoff from the playground and parking lot. The porous pavement can be used for a walking trail between areas used by visitors.

A



B



C



1 BIORETENTION SYSTEM



2 POROUS PAVEMENT





Cohanzick Zoo  
Green Infrastructure Information Sheet

<b>Location:</b> 45 Mayor Aitken Drive Bridgeton, NJ 08302	<b>Municipality:</b> City of Bridgeton
	<b>Subwatershed:</b> Cohansey River
<b>Green Infrastructure Description:</b> bioretention system porous pavement	<b>Targeted Pollutants:</b> total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS) in surface runoff
<b>Mitigation Opportunities:</b> recharge potential: yes stormwater peak reduction potential: yes TSS removal potential: yes	<b>Stormwater Captured and Treated Per Year:</b> bioretention system #1: 11,000 gal. bioretention system #2: 4,300 gal. porous pavement: 2,500 gal.
<b>Existing Conditions and Issues:</b> This site, located at the main parking lot for Cohanzick Zoo, currently experiences large volumes of stormwater runoff. Stormwater drains onto the site from Mayor Aitken Drive and drains directly off of the parking lot eroding the nearby vegetative cover. Various factors such as impervious cover, street runoff, and poor soil quality all contribute to insufficient stormwater management. Not only does stormwater runoff put stress on existing infrastructure and vegetation, but it also carries with it various pollutants that may cause harm to nearby waterways.	
<b>Proposed Solution(s):</b> Capturing stormwater on this site will help prevent the spread of nonpoint source pollution, while allowing the stormwater to infiltrate back into the groundwater, helping to slow the degradation of current infrastructure. Two bioretention system could be installed on this site in the vegetated area adjacent to the parking lot. A bioretention system will intercept a portion of the stormwater runoff from the parking lot and roadway. This system will capture pollutants, recharge the groundwater, and add great aesthetic value to the property. A permeable pavement path is also recommended at the Cohanzick Zoo. Porous pavement, such as grass pavers could be placed in the grass area between the parking lot and the existing bike path.	
<b>Anticipated Benefits:</b> Since the bioretention systems would be designed to capture, treat, and infiltrate the entire 2-year design storm (3.3 inches of rain over 24 hours), these systems are estimated to achieve a 95% pollutant load reduction for TN, TP, and TSS. A bioretention system would also provide ancillary benefits, such as enhanced wildlife and aesthetic appeal to the local residents.  The grass pavers would have a stone reservoir beneath it to store the stormwater and slowly let it infiltrate into the ground. The system would contain an underdrain so larger rainfall events could bypass the system.	
<b>Possible Funding Sources:</b> City of Bridgeton mitigation funds from local developers	

Cohanzick Zoo  
Green Infrastructure Information Sheet

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NJDEP grant programs such as 319(h) and 604(b)  
Boy Scouts, Girl Scouts, or service projects

**Partners/Stakeholders:**

Rutgers Cooperative Extension  
Delaware Bayshore Program  
American Littoral Society  
City of Bridgeton

**Estimated Cost:**

Rain garden #1 would need to be approximately 500 square feet. At \$5 per square foot, the estimated cost is \$2,500. Rain garden #2 would need to be approximately 200 square feet. At \$5 per square foot, the estimated cost is \$1,000.

The grass pavers will cover approximately 390 square feet and have a one-foot stone reservoir under the surface. At \$20 per square foot, the cost of the grass paver system would be \$7,800.



City of Bridgeton  
Impervious Cover Assessment  
*Sunset Lake, 66 West Park Drive*

PROJECT LOCATION:



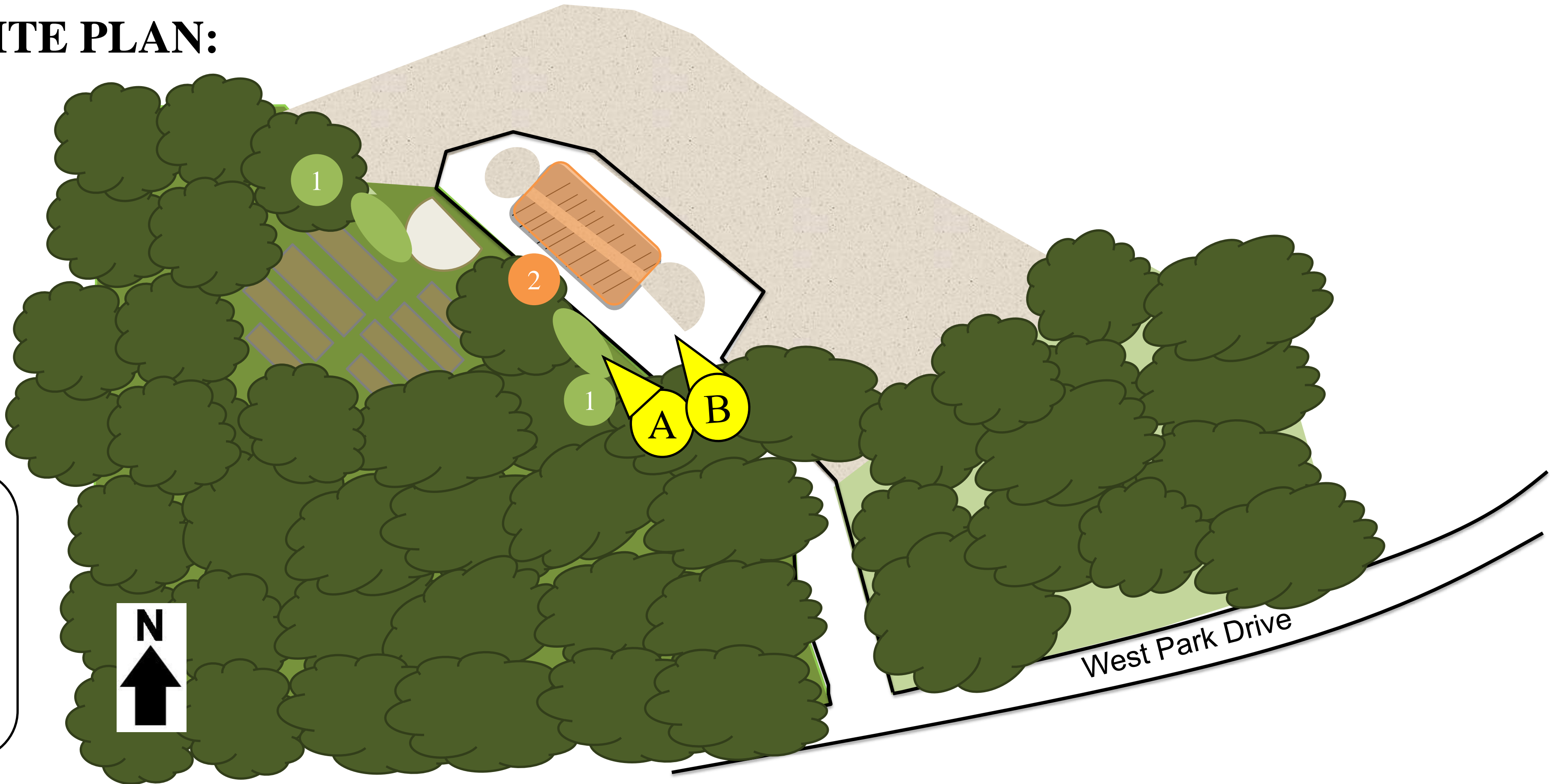
A



B



SITE PLAN:



- 1 **BIORETENTION SYSTEM:** Rain gardens can be installed on this property to reduce sediment and nutrient loading to the lake. There are two opportunities to install rain gardens along the edge of the parking lot.
- 2 **POROUS PAVEMENT:** Porous pavement promotes groundwater recharge and filters stormwater. The parking lot can be replaced with porous asphalt to allow runoff to infiltrate.

1 **BIORETENTION SYSTEM**



2 **POROUS PAVEMENT**





Sunset Lake  
Green Infrastructure Information Sheet

<b>Location:</b> 66 West Park Drive Bridgeton, NJ 08302	<b>Municipality:</b> City of Bridgeton
	<b>Subwatershed:</b> Cohansey River
<b>Green Infrastructure Description:</b> bioretention system porous pavement	<b>Targeted Pollutants:</b> total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS) in surface runoff
<b>Mitigation Opportunities:</b> recharge potential: yes stormwater peak reduction potential: yes TSS removal potential: yes	<b>Stormwater Captured and Treated Per Year:</b> bioretention system #1: 5,000 gal. bioretention system #2: 8,800 gal. porous pavement: 57,000 gal.
<b>Existing Conditions and Issues:</b> This site, located along the southern shore of Sunset Lake, currently experiences large volumes of stormwater runoff. Water drains to the site from the nearby roadway (W Park Drive) and drains directly off of the parking lot into Sunset Lake. Various factors such as impervious cover, street runoff, and poor soil quality all contribute to poor stormwater management. Not only does stormwater runoff put extra stress on existing infrastructure and vegetation, but it also carries with it various pollutants that may cause harm to nearby waterways, specifically Sunset Lake.	
<b>Proposed Solution(s):</b> Capturing stormwater on this site will help prevent the spread of nonpoint source pollution, while allowing the stormwater to infiltrate into the ground. This will also help to reduce the amount of sediment and suspended solids deposited in the lake. To manage stormwater at Sunset Lake, the existing parking lot could be replaced with porous asphalt. Unlike typical asphalt that promotes large amounts of stormwater runoff, porous asphalt allows water to infiltrate through the pavement. Two bioretention systems could be installed around the perimeter of the parking lot to treat additional stormwater.	
<b>Anticipated Benefits:</b> Since the bioretention systems would be designed to capture, treat, and infiltrate the entire 2-year design storm (3.3 inches of rain over 24 hours), these systems are estimated to achieve a 95% pollutant load reduction for TN, TP, and TSS. A bioretention system would also provide ancillary benefits, such as enhanced wildlife and aesthetic appeal to the visitors of the lake.  Porous pavement allows stormwater to infiltrate through to soil layers which will promote groundwater recharge as well as intercept and filter stormwater runoff. The porous pavement system will achieve the same level of pollutant load reduction for TN, TP, and TSS as the bioretention system.	
<b>Possible Funding Sources:</b> City of Bridgeton mitigation funds from local developers	

Sunset Lake  
Green Infrastructure Information Sheet

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NJDEP grant programs such as 319(h) and 604(b)

**Partners/Stakeholders:**

Rutgers Cooperative Extension  
Delaware Bayshore Program  
American Littoral Society  
City of Bridgeton

**Estimated Cost:**

Rain garden #1 would need to be approximately 400 square feet. At \$5 per square foot, the estimated cost is \$2,000. Rain garden #2 would need to be approximately 300 square feet. At \$5 per square foot, the estimated cost is \$1,500.

The porous asphalt would cover 390 square feet and have a two-foot stone reservoir under the surface. At \$25 per square foot, the cost of the porous asphalt system would be \$9,750.

The total cost of the project would be \$13,250.



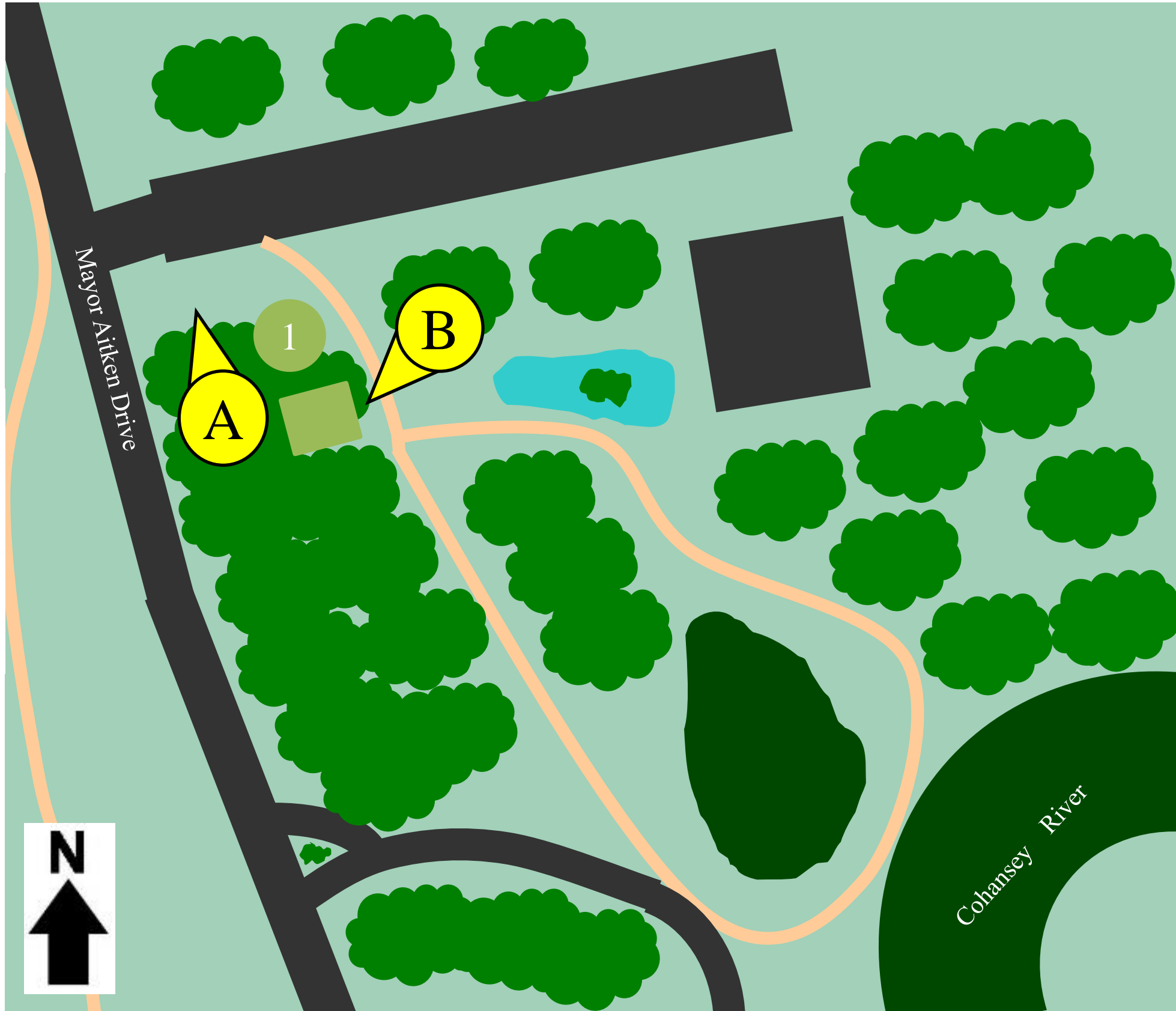
City of Bridgeton  
Impervious Cover Assessment  
*Veterans Memorial Park, 15 Mayor Aitken Drive*



PROJECT LOCATION:



SITE PLAN:



A

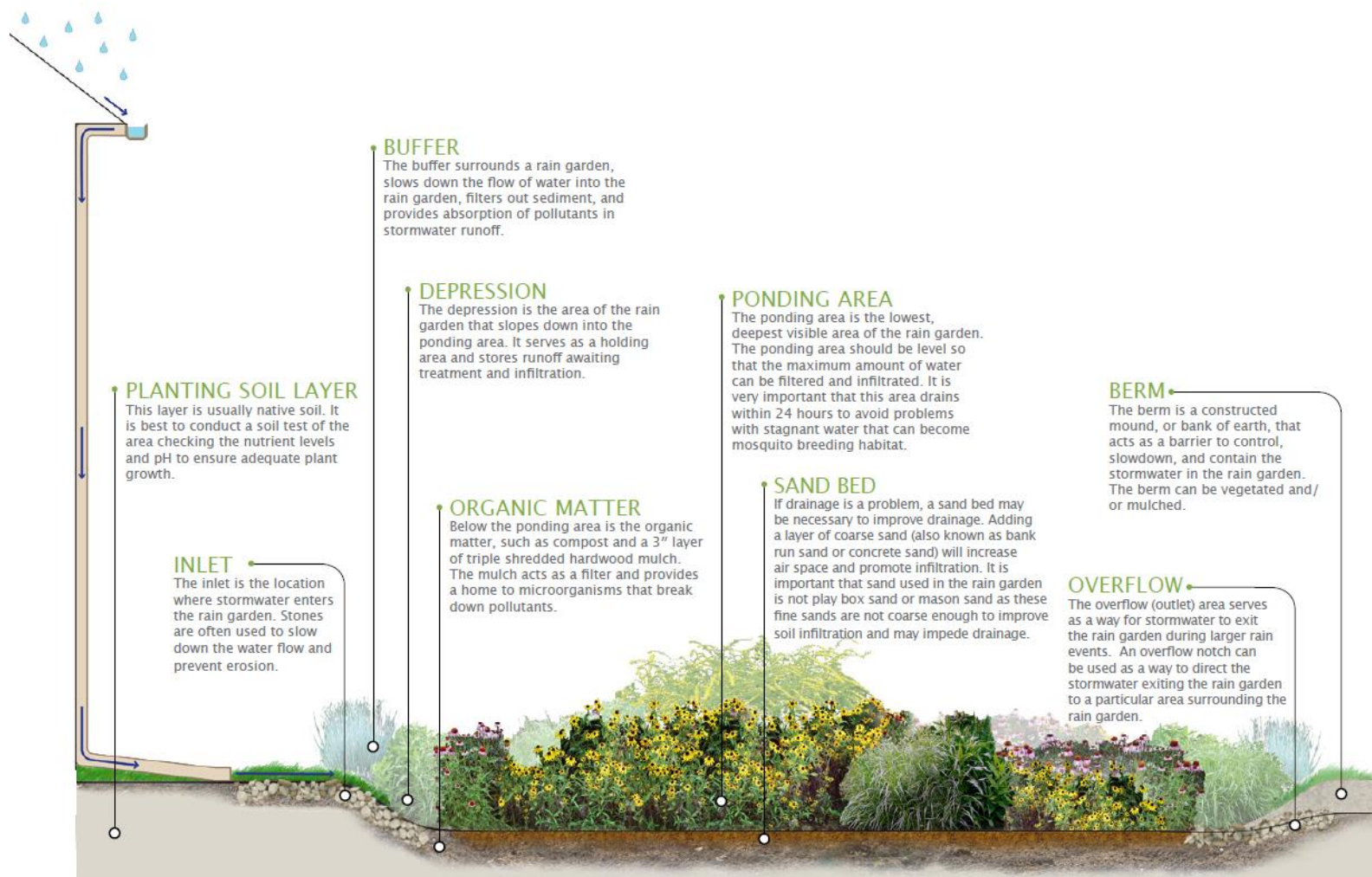


B



1 **BIORETENTION SYSTEMS:** A rain garden could be used to reduce sediment and nutrient loading to the local waterway and increase groundwater recharge. There is an area alongside a walking path where a rain garden could be installed at the park

1 **BIORETENTION SYSTEMS**





Veterans Memorial Park  
Green Infrastructure Information Sheet

<b>Location:</b> 15 Mayor Aitken Drive Bridgeton, NJ 08302	<b>Municipality:</b> City of Bridgeton
	<b>Subwatershed:</b> Cohansey River
<b>Green Infrastructure Description:</b> bioretention systems (rain gardens)	<b>Targeted Pollutants:</b> total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) in surface runoff
<b>Mitigation Opportunities:</b> recharge potential: yes stormwater peak reduction potential: yes TSS removal potential: yes	<b>Stormwater Captured and Treated Per Year:</b> bioretention system: 16,675 gal.
<b>Existing Conditions and Issues:</b> In Veterans Memorial Park there is an existing bioretention system to deal with the marsh nearby. It is important that the bioretention system filters and treats the water before entering the Cohansey River, a tributary of the Delaware River.	
<b>Proposed Solution(s):</b> The best option for this site is to install an additional bioretention system at the park, which can be built adjacent to a walking path.	
<b>Anticipated Benefits:</b> Since the bioretention system would be designed to capture, treat, and infiltrate the entire 2-year design storm (3.3 inches of rain over 24 hours), this system is estimated to achieve a 95% pollutant load reduction for TN, TP, and TSS. A bioretention system would also provide ancillary benefits such as enhanced wildlife and aesthetic appeal at the park as well as a learning opportunity.	
<b>Possible Funding Sources:</b> City of Bridgeton mitigation funds from local developers NJDEP grant programs	
<b>Partners/Stakeholders:</b> City of Bridgeton residents local community groups (Boy Scouts, Girl Scouts, etc.) American Littoral Society Rutgers Cooperative Extension	
<b>Estimated Cost:</b> The proposed rain garden would need to be approximately 160 square feet. At \$5 per square foot, the estimated cost is \$800.	