Project Name: Restoration of Riparian Zones with Filter Strips or Forested Buffers

Demonstration Site Location:	Subwatershed Priority:
Barkers Brook at the intersection of Saylors Pond Road and Julius-Georgetown Road, Springfield Township, New Jersey	BB1

BMP Type and Description:

Filter strips are areas of herbaceous vegetation situated between cropland, grazing land, forest land, or disturbed land and environmentally sensitive areas, such as streams or lakes. Filter strips reduce contaminant loadings from overland stormwater runoff and function as a riparian buffer to enhance wildlife habitat and maintain watershed function (NRCS Conservation Practice Job Sheet 393).

Issues and Concerns:

The *New Jersey Integrated Water Quality Monitoring and Assessment Reports* list the Assiscunk Creek Watershed as an impaired waterbody not meeting water quality standards. Total maximum daily loads (TMDLs) for the Assiscunk Creek Watershed (including the Annaricken Brook and the Upper Barkers Brook) require reductions of fecal coliform and phosphorus loadings for the watershed to achieve its use designations. The Assiscunk Creek Watershed is largely dominated by agricultural land use. Farming activities have the potential to significantly impact water quality if proper practices are not in place. The production procedures and inputs associated with agricultural operations can result in pollutants entering waterways. These pollutants include sediment, nutrients (nitrogen and phosphorus), bacteria (fecal coliform), and salts. Soil erosion from agricultural lands, improper fertilizer use, and mismanaged livestock waste are all concerns in the Assiscunk Creek Watershed. In addition, land requirements for agriculture practices often result in vegetation losses from natural riparian buffer areas. The lack of a vegetated buffer may decrease the natural infiltration, deposition, absorption, and adsorption capabilities that typically control the quality and quantity of stormwater runoff from the land.

Existing Conditions at Demonstration Site:

The proposed site for this demonstration project is a portion of Barkers Brook in Springfield Township. There is approximately 1,500 feet of stream that has minimal riparian vegetation on either side. The brook runs between two agricultural areas with cropland and is in close proximity to an extensive equine farm. The slope of adjacent land is very shallow (1%). Approximately 80 acres of land drains to this segment of Barkers Brook.

Proposed Solutions at Demonstration Site:

Two options should be considered for the demonstration site. Descriptions and recommended widths are prescribed according to NRCS standards:

1) A filter strip may be installed along the stream bank at a minimum width of 30 feet on either side, with minimal impact on the everyday operations of adjacent farms.

2) A riparian forested buffer may be installed along the stream banks at a minimum width of 70 feet on either side, with minimal impact on the everyday operations of adjacent farms. The riparian forest buffer would include a three zone system:

   Zone One: This zone will directly border Barkers Brook. It will contain trees and shrubs necessary for aquatic shade, bank stability, and woody debris.

   Zone Two: This zone is upgradient of Zone One and contains trees, shrubs, and ground cover vegetation for filtering sediment and pollutants from runoff.

   Zone Three: This zone is landward and upgradient of Zone Two. It consists of a strip of herbaceous cover that functions as a filter and maximizes sediment-trapping capabilities. This zone is provided for runoff control and has the same specifications as a filter strip.

Anticipated Benefits:

The NJDEP BMP Manual identifies vegetative filter strips as achieving a 30% removal rate for total nitrogen and total phosphorus. Total suspended solids (TSS) loadings may be reduced by up to 80%. A filter strip will provide enhanced wildlife habitat and can be incorporated into existing crop rotation.

Major Implementation Issues:

A strip of land, approximately 1,500 feet in length and 30 feet in width will be required for the vegetated filter strip installation. The landowner will be responsible for the maintenance of the filter strip after installation. Tasks may include controlling weed growth, removing trapped sediment, and occasional mowing.

Possible Funding Sources:

United States Department of Agriculture, NRCS
New Jersey Department of Agriculture Conservation Assistance Program and Soil and Water Conservation Cost Share Program
United States Environmental Protection Agency
New Jersey Department of Environmental Protection 319(h) grants
Local water utilities

Potential Partners/Stakeholders:

Burlington County
Springfield Township
Burlington County Soil Conservation District
Rutgers Cooperative Extension of Burlington County
South Jersey RC&D
New Jersey Pinelands Commission
Local watershed groups
Local water utilities
Landowners

Task	Task Description			Estimated Cost
1	Complete topographic survey and soil tests			$500
2	Prepare final design			$1,000
	Activities for BMP installation	Unit Cost	Quantity	
	Plant materials (seed mix)	$5/lb	50 lb	$250
	Soil amendments, if necessary (lime, fertilizer)	-	-	$300
	Installation (assume volunteer-based effort)	$25.22/hr*	15 people 8 hr/person	$3,027
	Supervision of volunteers	$1,000	1	$1,000
	Contingency (20%)	-	-	$805
			Total BMP Installation Cost	**$5,382**
			Total Estimated Project Cost	**$6,882**
Annual operation and maintenance cost (estimated)				$100

*Based on New Jersey State Value for Volunteer Time as reported by the Corporation for National and Community Service

Project Name: Naturalized Agricultural Drainage Swales	
Demonstration Site Location: Approximately 0.4 miles northeast of the intersection of Island Road and Columbus Jobstown Road, Springfield Township, New Jersey	Subwatershed Priority: ANR
BMP Type and Description: Naturalized drainage swales are considered equivalent to grassed waterways and are defined by NRCS Conservation Practice Standard 412 as graded channels that are established with suitable vegetation to carry surface water at a non-erosive velocity to a stable outlet.	
Issues and Concerns: The *New Jersey Integrated Water Quality Monitoring and Assessment Reports* list the Assiscunk Creek Watershed as an impaired waterbody not meeting water quality standards. Total maximum daily loads (TMDLs) for the Assicunk Creek Watershed (including the Annaricken Brook and the Upper Barkers Brook) require reductions of fecal coliform and phosphorus loadings for the watershed to achieve its use designations. The Assiscunk Creek Watershed is largely dominated by agricultural land use. Farming activities have the potential to significantly impact water quality if proper practices are not in place. The production procedures and inputs associated with agricultural operations can result in pollutants entering waterways. These pollutants include sediment, nutrients (nitrogen and phosphorus), bacteria (fecal coliform), and salts. Soil erosion and the proper management of livestock waste are all concerns in the Assiscunk Creek Watershed. Many farmers incorporate drainage swales into their site to collect and route stormwater runoff from the agricultural lands to nearby streams or waterbodies. These swales are typically narrow with unstable banks and exposed soil surfaces due to lack of vegetation. These conditions contribute to sediment and nutrient loadings to the Assiscunk Creek Watershed.	
Existing Conditions at the Demonstration Site: The drainage swale at the proposed demonstration site is approximately 1,800 feet in length and narrow with steep side slopes. While the swale works well at draining the adjacent farmland, stormwater runoff is not adequately treated as the swale directs overland flow downstream. The bottom surface of the swale is characterized by exposed soil with little to no vegetation or other erosion control measures.	
Proposed Solutions: The steep banks will be re-graded so that the side slopes are no greater than 3:1 (3 feet horizontal for every 1 foot vertical change). The bottom and side slopes will be vegetated. Herbaceous plugs, shrubs, and seed mix will be selected to fit the soil type and environment. A buffer may be added to one or both sides of the swale for additional water quality improvements and enhanced wildlife habitat.	
Anticipated Benefits: The root systems of the vegetation will form large open channels at deeper soil depths, facilitating deep-water percolation and increased infiltration of stormwater runoff. Nutrient and sediment loadings will decrease via plant uptake and deposition, respectively. The vegetated swale will reduce gully erosion and provide a natural conveyance system for overland flow, thereby protecting water quality and mitigating flooding.	
Major Implementation Issues: The existing drainage swale will be widened to accommodate the necessary re-grading of side slopes. The installation of this BMP will require that land originally dedicated to crop rotations or other farming practices be used for stormwater management instead. Landowners must agree to this and be willing to take responsibility for the necessary maintenance measures associated with the BMP.	

Possible Funding Sources:
United States Department of Agriculture, NRCS
New Jersey Department of Agriculture Conservation Assistance Program and Soil and Water Conservation Cost Share Program
United States Environmental Protection Agency
New Jersey Department of Environmental Protection 319(h) grants
Local water utilities

Potential Partners/Stakeholders:
Burlington County
Springfield Township
Burlington County Soil Conservation District
South Jersey RC&D
Rutgers Cooperative Extension of Burlington County
New Jersey Pinelands Commission
Local water utilities

Task	Task Description			Estimated Cost
1	Complete topographic survey and soil testing			$1,000
2	Prepare final design			$1,000
3	Prepare maintenance plan			$500
	Activities for BMP installation	Unit Costs	Quantity	
	Re-vegetation of swale (assume volunteer effort)	$25.22/hr*	15 people 8 hr/person	$3,027
	Supervision of volunteers	-	-	$1,000
	Re-grading of swale (assume contractor effort)	$5,000	1	$5,000
	Contingency (20%)	-	-	$1,805
	Total Estimated BMP Installation Cost			**$10,832**
	Total Estimated Project Cost			**$13,332**
Annual operation and maintenance cost (estimated)				$100

*Based on New Jersey State Value for Volunteer Time as reported by the Corporation for National and Community Service

Project Name: Parking Lot Retrofit with Filterra® Bioretention Systems

Demonstration Site Location:	Subwatershed Priority:
Columbus Farmers Market and Shopping Center South Columbus, New Jersey	ASK3

BMP Type and Description:

Filterra® Bioretention Systems are designed to be integrated into existing stormwater infrastructure while providing pollutant removal capabilities and aesthetic value to a given site.

Issues and Concerns:

The *New Jersey Integrated Water Quality Monitoring and Assessment Reports* list the Assiscunk Creek Watershed as an impaired waterbody not meeting water quality standards. Total maximum daily loads (TMDLs) for the Assiscunk Creek Watershed (including the Annaricken Brook and the Upper Barkers Brook) require reductions of fecal coliform and phosphorus loadings for the watershed to achieve its use designations. Stormwater runoff, when managed improperly, is a major pathway for the transportation of these pollutants. As runoff flows over impervious surfaces, such as roofs, driveways, and parking lots, it can accumulate and transport sediment, fertilizer, and/or bacteria, which may be washed directly into nearby rivers or streams, ultimately degrading the surface water quality.

Existing Conditions at Demonstration Site:

The Columbus Farmers Market and Shopping Center is located in close proximity to the mainstem Assiscunk Creek. The parking lot is approximately seven (7) acres. The portion of the lot targeted for this project is located in the front of the Market, which sees the most traffic and is the best location for a demonstration project.

Proposed Solutions at Demonstration Site:

The Filterra® Bioretention Systems are precast concrete structures with a tree frame and grate cast in the top slab and engineered filter media topped with mulch that supports a tree or other type of plants below grade. The system is comprised of three main components: mulch, engineered filter media, and vegetation. This system collects stormwater runoff from its drainage area and filters the water through the mulch, media and vegetation. The treated runoff is then discharged to the existing stormwater infrastructure.

Anticipated Benefits:

The Columbus Farmers Market is located approximately 750 feet from the mainstem Assiscunk Creek. Stormwater runoff from the parking lot contributes sediment, grease and oil, and bacteria to the waterway, degrading the water quality downstream. Four (4) standard Filterra® units will disconnect approximately one (1) acre of the parking lot and treat 6,000 gallons of stormwater runoff per hour of precipitation.

The estimated pollutant removal efficiency of the Filterra® Bioretention Systems are:

E. coli: 99%

Enterococcus: 95%

Fecal coliform: 98%

Predicted phosphorus removal: 60% - 70%

Predicted nitrogen removal: 43%

Predicted total suspended solids (TSS) removal: 85%

Predicted heavy metal removal: 33% - 82%

Predicted oil & grease removal: 85%

Major Implementation Issues:

The installation of Filterra® Bioretention Systems would require excavation and earthwork for installation at the Columbus Farmers Market and Shopping Center. The installation of this BMP may require the loss of multiple parking spaces. The costs associated with design, installation, and maintenance may also be a deterrent to implementation.

Possible Funding Sources:

Competitive grants from New England Interstate Water Pollution Control Commission
New Jersey Department of Environmental Protection 319(h) grants
New Jersey Water Resources Research Institute grants

Potential Partners/Stakeholders:

Burlington County
Township of Mansfield
Columbus Farmers Market and Shopping Center
Local watershed groups
Burlington County Soil Conservation District
Rutgers Cooperative Extension of Burlington County
New Jersey Pinelands Commission

Cost Estimate:

Total installed cost is estimated at $12,000 to $14,000 per unit. This includes the excavation of the site for the planters, the trenching and connection of transfer pipes, crane installation of the planter box, and set-up and maintenance of the tree. The cost of installation for four (4) Filterra® boxes will range from $48,000 to $56,000.

Project Name: Retrofit of Rural Road Drainage Systems

Location:	Subwatershed Priority:
The Assiscunk Creek Watershed, including roadways within Springfield Township and Mansfield Township	ASK2

BMP Type and Description:
Vegetated Swale

Issues and Concerns:
Roadways and agricultural landscapes can be a source of sediment, phosphorus and bacteria to a local waterway. Pollutants that accumulate on streets (sediment, phosphorus, nitrogen and bacteria) can mix with stormwater to run off into rural road drainage systems that discharge to streams. The fertilizer used on agricultural land uses can be a source of phosphorus and nitrogen, while manure used as fertilizer and wildlife grazing on agricultural land can be a source of fecal coliform in a watershed. These accumulated pollutants can be carried to the local waterways via stormwater runoff. Rural road drainage systems can carry runoff from these potential sources directly to the stream. Rural road drainage systems designed solely for drainage purposes may be sparsely vegetated and actively eroding. These rural road drainage systems are generally preferred over a hard structure conveyance, but there is the potential to improve stormwater management by stabilizing the banks and increasing healthy vegetation for filtration and infiltration purposes.

Existing Conditions:
Multiple rural road drainage systems within the watershed are both undercut and undersized. Many rural road drainage systems are scoured and actively eroding. Where there is vegetation in the rural road drainage system, turf grass dominates. Bare soil is often exposed along the entire bottom of the rural road drainage system. This bare compacted soil without root structure allows the rural road drainage system to become a source of sediment during storm events and provides minimal infiltration potential. Runoff comes from both roadways and adjacent agricultural land. Many of these rural road drainage systems have an outlet that is a pipe that discharges to a stream. The shape of these rural road drainage systems may be compromised with high steep side slopes that force the elevation to rise quickly in the channel. Stormwater runoff may travel very quickly through these rural road drainage systems, further eroding the side slopes and the rural road drainage system bottom preventing vegetation from establishing.

Proposed Solutions:
The purpose of the rural road drainage system is to transport runoff from a drainage area to the nearby waterway. A down cut eroded rural road drainage system can transport nonpoint source pollution directly to the stream, while a properly designed well-vegetated swale can slow the velocity of the flow, intercept pollutants and increase groundwater recharge.

A rural road drainage system can be reconstructed to meet the design requirements set forth in the NJ Soil Erosion and Sediment Control Standards. In general, rural road drainage systems and swales should have wider bottom widths and maximum side slopes of 3:1. These dimensions are optimal for plant growth. Native warm season grasses and herbaceous plants that can survive both dry and very wet environments can be used for re-vegetation purposes. If grass is preferred, hydro-seeding should occur during a period of fair weather to allow the grass to establish. The size of the rural road drainage system may be constrained by the size of the right–of –way (ROW). Smaller areas limit how the rural road drainage system can be shaped during the retrofitting process. If the shape of the rural road drainage system cannot be properly altered, then other methods must be used to reduce the velocity of the

runoff traveling through the rural road drainage system.

In addition to stabilizing eroding soils and reconstructing the rural road drainage systems, opportunities exist to retrofit many of these areas into water quality swales. The design of the swales will depend on site-specific parameters, such as the ROW width, depth to groundwater, nearby vegetation, and topography. In general, the water quality retrofits should include infiltration and bioretention media, native plantings and vegetation, and periodic gabion check dams to detain flows for maximum water quality protection.

Gabion mattresses can be used as check dams in the rural road drainage system to reduce the velocity of the runoff traveling through the rural road drainage system. Gabion mattresses are metal cages in the shape of long, wide and flat boxes. The cages can be several feet long and several feet wide and only six inches tall. The cages are filled with large stone (rip-rap). After the stones have been placed across the side slopes and bottom of the rural road drainage system, the rock cage is closed tight. The mattresses would be placed in the rural road drainage system approximately every 100 feet, depending on slope and would obstruct the flow from runoff to reduce water velocity.

For areas with a large amount of sediment issues, a concrete pretreatment forebay for swales with check dams can be installed. The size of the concrete pretreatment forebay would be matched to equipment that was readily available to ensure sediment removal with ease of maintenance.

Anticipated Benefits:

The retrofitted rural road drainage systems are expected to infiltrate a greater amount of water during each storm event and to remove more nutrients and sediment from the runoff of each storm. The native vegetation will typically grow taller and have a deeper root system and will have a strong filtration effect on the stormwater runoff by removing sediment and nutrients. Infiltration rates also will increase in the retrofitted rural road drainage systems. The increased infiltration rate of the rural road drainage system will reduce the amount of water discharged after each storm. This will prevent sediment and nutrients from entering the local waterway. After the retrofits are complete, the rural road drainage system would be similar to a vegetative buffer and is expected to have the same pollutant removal rates. Vegetative buffers typically remove 60 to 80% of total suspended solids, 30% of total phosphorus and total nitrogen.

Major Implementation Issues:

The retrofit of the existing rural road drainage systems includes the use of native vegetation that is expected to grow taller and require less maintenance than the current vegetation. This may be considered unkempt by residents. Public education on the benefits of these retrofitted rural road drainage systems will be essential in minimizing stakeholder dissatisfaction.

An additional implementation issue could be the available land for the ROW that will be used during the retrofit. Original designs may need to be modified to work in the allotted space.

Possible Funding Sources:

New Jersey Department of Environmental Protection 319(h) grants
New Jersey Department of Transportation
United States Department of Agriculture, NRCS
New Jersey Department of Agriculture Conservation Assistance Program and Soil and Water Conservation Cost Share Program

Potential Partners/Stakeholders:

Burlington County
Local municipalities
Burlington County Soil Conservation District
South Jersey RC&D
Rutgers Cooperative Extension of Burlington County
New Jersey Pinelands Commission
Local watershed groups
Local water utilities
Landowners

Task	Task Description			Estimated Cost
1	Apply for soil erosion and sediment control permit			$500
2	Complete topographic survey and soils test			$1,000
3	Prepare final design			$2,500
4	Prepare maintenance plan per NJDEP requirements			$2,000
5	Prepare construction documents and solicit quotes from contractors			$2,000
	Activities for BMP installation	Unit Cost	Quantity	
	Mobilization/erosion control	$35	100 LF	$3,500
	Supervision of volunteers for vegetation	$2,000	1	$2,000
	Swale construction	$100	100 LF	$10,000
	Rip-rap check dam	$1,000/100 linear feet	IF NEEDED	$-
	Contingency (20%)		1	$3,100
	Total BMP installation costs			$18,600
Total Estimated Project Cost				**$26,600**
Annual operation and maintenance cost				$500

*Note: Construction and operation and maintenance costs are per 100 linear feet of rural road drainage system

Supplemental maps, graphs and photos:
Location map

Project Name: Stream Corridor Restoration

Demonstration Site Location:	Subwatershed Priority:
South of Mount Pleasant Road Mansfield Township, New Jersey	ASK1

BMP Type and Description:

Streambank and shoreline protection include treatment(s) designed to stabilize and protect banks of streams or constructed channels. This applies to areas where banks are especially susceptible to erosion. The design should mimic the natural conditions present in stable reaches proximate to the area (NRCS Conservation Practice Standard 580).

Issues and Concerns:

The *New Jersey Integrated Water Quality Monitoring and Assessment Reports* list the Assiscunk Creek Watershed as an impaired waterbody not meeting water quality standards. TMDLs for the Assiscunk Creek Watershed (including the Annaricken Brook and the Upper Barkers Brook) require reductions of fecal coliform and phosphorus loadings for the watershed to achieve its use designations. Both natural and anthropogenic forces contribute to excessively eroding streambanks. This erosion may result in the loss of vegetation from both the bank itself and from riparian areas.

Existing Conditions at Demonstration Site:

The proposed site for this demonstration project is a portion of the Assiscunk Creek in Mansfield Township. A 100-foot segment of streambank is targeted for vegetative stabilization treatments. There is noticeable erosion and loss of riparian vegetation, as well as leaning trees and shrubs along the bank.

Proposed Solutions at Demonstration Site:

There are two options to be considered for this site:

1. Stone toe protection secures the lower portion of the streambank. A row of stone is placed parallel to the stream along the eroding bank. In time, a stable bank is created as sediment is deposited behind the stones. This treatment can be used in conjunction with live stakes or geotextile netting.
2. Coir fiber rolls consist of tightly bound cylinders of coconut fiber (coir fiber) held together by a coir fiber netting. The rolls provide toe protection where scour is not severe. Once installed, the coir fiber log becomes saturated with water and vegetation can be planted directly in them. Coir fiber rolls provide a natural appearance and decompose over a three to six-year period, leaving the roots of colonizing vegetation to secure the toe of the streambank. This treatment can be used in conjunction with live stakes or geotextile netting.

Anticipated Benefits:

Streambank stabilization and protection will promote beneficial sediment deposition and the filtering of sediment, sediment-attached and dissolved substances. Increased vegetation will improve habitat value for fish and wildlife.

Major Implementation Issues:

Implementation issues include reduced site access and long term maintenance requirements. Protective treatments should be as self-sustaining as possible but will require oversight to ensure proper function and plant integrity.

Possible Funding Sources:

United States Department of Agriculture, NRCS

New Jersey Department of Agriculture Conservation Assistance Program and Soil and Water Conservation Cost Share Program

United States Environmental Protection Agency
New Jersey Department of Environmental Protection 319(h) grants
Local water utility

Potential Partners/Stakeholders:
Burlington County
Township of Mansfield
Burlington County Soil Conservation District
South Jersey RC&D
Rutgers Cooperative Extension of Burlington County
New Jersey Pinelands Commission
Local watershed groups
Local water utilities
Landowners

Task	Task Description			Estimated Cost
1	Complete topographic and stream cross sectional survey			$1,000
2	Prepare final design			$2,000
3	Activities for BMP installation	Unit Cost	Quantity	
	Coir log (12”Diam x 10’L) (Option 1)	$90 ea.	20	$1,800
	Stone toe protection (Option 2)	$70/ft	200	$14,000
	Vegetation (quart)	$2/plant	100	$200
	Installation (assume volunteer-based effort)	$25.22/hr*	15 people 8 hr/person	$3,027
	Supervision of volunteers	$1,000	1	$1,000
	Contingency (20%)	-	-	$1,205-$3,645
	Total BMP Installation Cost			**$7,232-$21,872**
	Total Estimated Project Cost			**$10,232-$24,872**
Annual operation and maintenance cost				$100

*Based on New Jersey State Value for Volunteer Time as reported by the Corporation for National and Community Service

Project Name: Livestock Management Measures	
Demonstration Site Location: Farm off of Monmouth Road in Springfield (field verify)	Subwatershed Priority: ANR
BMP Type and Description: Livestock fencing is a permanent structure that acts as a barrier to livestock access to streams, springs, wetlands, and ponds (NRCS Conservation Practice Standard 382). Livestock fencing can reduce erosion and improve water quality by controlling the direct deposition of nutrients and bacteria to a waterway.	
Issues and Concerns: The *New Jersey Integrated Water Quality Monitoring and Assessment Reports* list the Assiscunk Creek Watershed as an impaired waterbody not meeting water quality standards. TMDLs for the Assiscunk Creek Watershed (including the Annaricken Brook and the Upper Barkers Brook) require reductions of fecal coliform and phosphorus loadings for the watershed to achieve its use designations. The Assiscunk Creek Watershed is largely dominated by agricultural land use. Farming activities have the potential to significantly impact water quality if proper practices are not in place. The production procedures and inputs associated with agricultural operations can result in pollutants entering waterways. These pollutants include sediment, nutrients (nitrogen and phosphorus), bacteria (fecal coliform), and salts. Soil erosion and the proper management of livestock waste are all concerns in the Assiscunk Creek Watershed. Many small acreage livestock owners rely on ponds and streams to provide animals with easy access to drinking water. This access to the waterway may lead to the destruction of vegetation, the loss of bank stability and the deposition of manure or urine directly into the water.	
Existing Conditions at Demonstration Site: Undetermined at present time	
Proposed Solutions at Applicable Sites: Fencing should be installed where natural barriers do not limit livestock access to streams or ponds. Fencing should be installed only in locations that allow flexibility in the schedule of land management activities such as nutrient application, pest control, or forage harvest. Waterway access ramps and designated stream crossing areas can be incorporated into plans for fencing installation.	
Anticipated Benefits: Limiting livestock access to streams will reduce bacterial loading and allow for the growth of natural riparian buffers. Consequently, streambank stability and sediment filtration from stormwater runoff will improve.	
Major Implementation Issues: Landowners must agree to an ongoing maintenance program, which would include inspection of fences subsequent to installation to insure proper function, periodic removal of brush and debris, and the performance of repairs as needed. The option of complete exclusion would necessitate the installation of an alternate watering facility, but cost sharing is available (NRCS Practice Code 614).	
Possible Funding Sources: United States Department of Agriculture, NRCS New Jersey Department of Agriculture Conservation Assistance Program and Soil and Water Conservation Cost Share Program United States Environmental Protection Agency New Jersey Department of Environmental Protection 319(h) grants Local water utilities	

Potential Partners/Stakeholders:
Burlington County
Springfield Township
Burlington County Soil Conservation District
South Jersey RC&D
Rutgers Cooperative Extension of Burlington County
New Jersey Pinelands Commission
Local water utilities

Task	Task Description	Estimated Cost
1	Prepare final plans and specifications for fence installation (as per site considerations)	$1,000
2	Materials and installation of fencing, access ramps, and crossings[A]	$29,900-$71,800
	Total Estimated Project Cost	**$30,900-$72,800**
Annual operation and maintenance cost (estimated)		$100

[A]Range of costs based on values reported by EPA Region 3 project in Spring Creek, PA and are relative to length of stream bank stabilized (804' to 3,640'). Further information and research results can be found at http://www.epa.gov/bioiweb1/pdf/EPA-903-F-02-007WatershedPartnershipProtectsWorld-ClassTroutStream.pdf.