APPENDIX D

Select Best Management Practice Concept Designs

Project ID: MB5_We_h	
Location: Segment of stream along 3rd Avenue	Municipality: Borough of Westwood Subwatershed: MB5
BMP Description: Riparian Buffer Restoration Streambank Stabilization	Targeted Pollutants: Fecal contamination from geese, total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) in surface runoff

Existing Conditions and Issues:
This location served as a sampling site for the surface water quality monitoring conducted in the summer of 2007. Currently, there is no vegetative buffer separating the Musquapsink Brook from the adjacent land. Geese inhabit this site and have been documented both in the stream and on the land. Because geese are prevalent in the Musquapsink Brook Watershed, they have been identified as significant contributors to fecal pollution. This portion of the stream also receives overland flow, which may carry excess nitrogen or phosphorus from fertilizer applications to nearby lawns or athletic fields. Evidence of downcutting is apparent along the streambank.

Proposed Solution(s):
A 30-foot wide buffer should be installed along the 150-foot section of stream that currently has no vegetation along the banks. This will prohibit geese from entering the Brook and will also function to filter out pollutants from overland flow. The streambank should be stabilized with live stakes and coir logs to prevent further erosion and downcutting.

Anticipated Benefits:
A 30-foot riparian buffer, similar to a vegetated filter strip, could be estimated to achieve a 30% removal rate for TN and TP, as reported in the NJDEP BMP Manual. TSS loadings may be reduced by up to 80%. Pathogens and bacteria such as *E. coli* and fecal coliform will be reduced by up to 90% as well. A riparian buffer would also provide ancillary benefits, such as enhanced wildlife habitat and aesthetic appeal to surrounding property owners. The biostabilization of the streambank would reduce sediment loadings. Ketler Elementary School is located across from the proposed site. Rutgers Cooperative Extension Water Resources Program could present the *Stormwater Management in Your School Yard* curriculum to students and then include them in the riparian buffer planting efforts as an augmentation to the in-class lessons. It can also be used as a demo project to launch educational programming for public works and park staff.

Possible Funding Sources:
319(h) grants from the New Jersey Department of Environmental Protection
Bergen County Soil Conservation District
Borough of Westwood
United Water New Jersey

Partners/Stakeholders:
Borough of Westwood
Ketler Elementary School
Bergen SWAN or other watershed groups

Estimated Cost:

Task	Task Description			Estimated Cost
1	Complete topographic survey and soils test			$500
2	Prepare final design			$1,000
3	Activities for BMP installation	Unit Cost	Quantity	
	Plant materials	$5.00	1,125	$5,625
	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
	Educational programs (Schools and DPW)	$2,000		$2,000
	Contingency (20%)	-	-	$2,390
			Total BMP Installation Cost	**$14,342**
			Total Estimated Project Cost	**$15,842**

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

Project ID: MB4_Wa_f	
Location: Washington Green Townhomes, Hampton Court	Municipality: Washington Township Subwatershed: MB4
BMP Description: Cluster rain gardens	Targeted Pollutants: total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS), pathogens (*E. coli* and fecal coliform)

Existing Conditions and Issues:
This site is a small residential community, with less than 50 townhouse units. There are two main drainage channels from the property to the Musquapsink Brook. Most of the impervious surfaces in this development drain to a riprap swale in poor condition. A small portion of the property drains to a 28" reinforced concrete pipe. The roof leaders are all directly connected to these conveyance channels. The section of the Brook receiving stormwater from this site is eroding because of the heavy water volumes.

Proposed Solution(s):
Cluster rain gardens are recommended for disconnection of impervious surfaces on this site. Approximately ten (10) bioretention systems, 200 square feet each, could be installed in this community.

Anticipated Benefits:
The rain gardens would each disconnect 1,000 square feet of impervious cover, reducing stormwater volumes by 250,000 gallons and reducing *E. coli*, fecal coliform, TN, TP, and TSS loads by 90%. The rain gardens would provide enhanced wildlife habitats and improved aesthetics.

Possible Funding Sources:
319(h) grants from the New Jersey Department of Environmental Protection
New Jersey Department of Transportation
Bergen County Soil Conservation District
Washington Township
United Water New Jersey

Partners/Stakeholders:
Washington Township
Bergen SWAN or other watershed groups
Residents of Washington Green Townhomes

Estimated Cost:

Task	Task Description			Estimated Cost
1	Complete topographic survey and soil tests			$500
2	Prepare final design			$1,500
3	Activities for BMP installation	Unit Cost	Quantity	
	Rain garden installation (assume contractor effort)*			$10,000
	Plant materials*	$10/unit	400	$4,000
	Contingency (20%)			$2,800
	Total BMP Installation Cost			**$16,800**
	Total Estimated Project Cost			**$18,800**

*Based on cluster rain garden installations at Tivoli Gardens in Parsippany-Troy Hills, NJ

<table>
<tr><td colspan="2">Project ID: MB5_We_e</td></tr>
<tr><td rowspan="2">Location:
Gritman Park and surrounding neighborhood</td><td>Municipality: Borough of Westwood</td></tr>
<tr><td>Subwatershed: MB5</td></tr>
<tr><td>BMP Description:
Vegetated buffer around pond
Streamside Living extension program for residents</td><td>Targeted Pollutants:
total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) in surface runoff, E. coli and fecal coliform (geese contributions)</td></tr>
<tr><td colspan="2">Existing Conditions and Issues:
Gritman Park contains a man-made pond with four stormwater inlets that drain adjacent properties and roadways. There is one outlet from the pond that ultimately discharges to the Musquapsink Brook. The pond has no riparian buffer, and geese fecal matter was documented on the park property. The pond is approximately one acre in area while the surrounding neighborhood covers nine acres. There are approximately 60 residential properties in the vicinity of Gritman Park.</td></tr>
<tr><td colspan="2">Proposed Solution(s):
A 30-foot vegetative buffer around the perimeter of the pond (approximately 600 feet) would deter geese from entering the water. The buffer would also intercept and filter overland flow, decreasing E. coli (fecal coliform) and sediment loadings to the stream.

A Streamside Living extension program for residents in the surrounding neighborhood would help to address the polluted runoff entering the pond via the stormwater inlets. The Streamside Living program would be modeled after the workshops offered in New Hampshire (Landscaping at the Water's Edge) and would engage homeowners in environmental stewardship. The program would offer information on the findings of this Watershed Restoration and Protection Plan, landscaping practices, local ordinance and land use regulations, and also on ideal BMPs for implementation on individual properties to achieve load reductions in TN, TP, TSS, and E. coli (fecal coliform). Workshop attendees could apply for "mini-grants" offered through the Streamside Living extension program. Selected applicants with approved designs would receive monetary support for installation of BMPs on their properties. This will reduce stormwater runoff at the source.</td></tr>
<tr><td colspan="2">Anticipated Benefits:
A 30-foot vegetative buffer, similar to a filter strip, could be estimated to achieve a 30% removal rate for TN and TP, as reported in the NJDEP BMP Manual. TSS loadings may be reduced by up to 80%. A buffer would also provide ancillary benefits such as enhanced habitat for desirable wildlife and aesthetic appeal to surrounding property owners. Up to 90% reduction of fecal coliform and E. coli is to be expected.</td></tr>
<tr><td colspan="2">Possible Funding Sources:
319(h) grants from the New Jersey Department of Environmental Protection
New Jersey Department of Transportation
Bergen County Soil Conservation District
Borough of Westwood
United Water New Jersey</td></tr>
</table>

Partners/Stakeholders:
Borough of Westwood
Bergen SWAN or other watershed groups

Estimated Cost:

Task	Task Description			Estimated Cost
1	Complete topographic survey			$500
2	Prepare final design			$1,500
3	Activities for BMP installation	Unit Cost	Quantity	
	Plant materials	$5/unit	4,500	$22,500
	Installation (assume volunteer-based effort)	$25.22/hr*	30 people/ 8 hours	$6,053
	Supervision of volunteers	$1,000	2	$2,000
	Contingency (20%)			$6,111
	Streamside Living extension program			$4,500
	Mini-grants for homeowners to install BMPs	$500/grant	30	$15,000
	Total BMP Installation Cost			**$56,164**
	Total Estimated Project Cost			**$58,164**

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

<table>
<tr><td colspan="2">Project ID: MB6_E_a</td></tr>
<tr><td>Location:
Roadways in residential neighborhood;
Intersection of Pascack Avenue and Haines Street</td><td>Municipality: Borough of Emerson

Subwatershed: MB6</td></tr>
<tr><td>BMP Description:
Curb extensions, flow-through planter boxes and rain gardens as part of a Green Street program.</td><td>Targeted Pollutants:
total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS), and fecal coliform in roadway surface runoff</td></tr>
<tr><td colspan="2">Existing Conditions and Issues:
This medium-density residential neighborhood contains approximately 85 homes on ¼ acre lots, with 76% of the properties containing directly connected impervious cover. Roadways account for approximately 2.5 acres (15%) of impervious cover in this area. Stormwater runoff from these roads contains sediment, salt, fuel hydrocarbons and/or nutrients that accumulate as a result of urban activities.</td></tr>
<tr><td colspan="2">Proposed Solution(s):
Green Streets reduce the negative impacts of stormwater runoff by mimicking natural conditions. Soil and native vegetation are used to manage runoff on the surface at the source. Curb extensions, flow-through planter boxes, and rain gardens will be installed as part of a comprehensive Green Street program for this neighborhood.
A curb extension is an angled narrowing of a roadway with a concurrent widening of the sidewalk space. Rain gardens can be incorporated into these extensions to capture stormwater flow from streets. Flow-through planter boxes are long, narrow landscaped areas with vertical walls and flat bottoms open to the underlying soil. They allow for increased stormwater storage volume in minimal space.</td></tr>
<tr><td colspan="2">Anticipated Benefits:
Green Streets have been shown to reduce peak stormwater flows by 80%. Fecal coliform, TN, TP and TSS will be removed through the filtering and adsorption capabilities of both the vegetation and soil. Flow-through planter boxes are estimated to achieve 25-50% TP removal and 40-60% TN removal.</td></tr>
<tr><td colspan="2">Possible Funding Sources:
319(h) grants from the New Jersey Department of Environmental Protection
New Jersey Department of Transportation
Bergen County Soil Conservation District
Borough of Emerson
United Water New Jersey</td></tr>
<tr><td colspan="2">Partners/Stakeholders:
Borough of Emerson
Bergen SWAN or other watershed groups</td></tr>
</table>

Estimated Cost:

Task	Task Description			Estimated Cost
1	Complete topographic survey and soils test			$500
2	Prepare final design			$1,500
3	Activities for BMP installation	Unit Cost	Quantity	
	Curb extensions	$44/sq ft	550 sq ft	$24,200
	Flow-through planter boxes	$35/sq ft	600 sq ft	$21,000
	Rain gardens	$2/sq ft	4,000 sq ft	$8,000
	Contingency (20%)			$10,640
	Total BMP Installation Cost			**$63,840**
Total Estimated Project Cost				**$65,840**

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

<table>
<tr><td colspan="2">Project ID: MB6_We_g</td></tr>
<tr><td rowspan="2">Location:
Berkeley Elementary School</td><td>Municipality: Borough of Westwood</td></tr>
<tr><td>Subwatershed: MB6</td></tr>
<tr><td>BMP Description:
Green Roof
Rain Garden
Permeable Pavement
Stormwater Management in Your School Yard Curriculum</td><td>Targeted Pollutants:
total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS) in surface runoff</td></tr>
<tr><td colspan="2">Existing Conditions and Issues:
This school located just upstream of the confluence of the Musquapsink Brook and Pascack Brook near sampling point MB6 and at the corner of Berkeley Avenue and Harrington Avenue. The Musquapsink Brook flows adjacent to the school property and receives direct runoff from the 0.5-acre parking lot situated next to it. The entire school property contains approximately 2.5 acres of directly connected impervious cover.</td></tr>
<tr><td colspan="2">Proposed Solution(s):
An extensive green roof is proposed for part of the school facility located along Harrington Avenue. An extensive green roof is 6 inches or shallower and is designed to be virtually self-sustaining and with minimal maintenance requirements.
Two (2) 200 square feet rain gardens are proposed for downspout disconnection on the main school building located along Berkeley Avenue.
Replacing the existing asphalt with permeable pavement on the easternmost parking lot is also recommended for this site.
Introduce Stormwater Management in your School Yard curriculum to engage students in how stormwater can have a negative impact on local bodies of water and how the students can have a positive impact in their own local surroundings.</td></tr>
<tr><td colspan="2">Anticipated Benefits:
The green roof would replace and disconnect approximately 4,000 square feet of rooftop. Green roofs are estimated to reduce runoff volumes by 50% on a yearly basis. This equates to 55,000 gallons of stormwater runoff that no longer reaches the Musquapsink Brook. Green roofs also offer benefits such as the mitigation of urban heat-island effects, conserving energy, creating wildlife habitat, and improving the aesthetics of a building (EPA, 2009).

The two (2) rain gardens would disconnect approximately 2,000 square feet of rooftop, capturing approximately 50,000 gallons of stormwater and removing 90% of TN, TP, and TSS loadings. The rain gardens can also reduce 90% of E. coli and fecal coliform loads in stormwater runoff by capturing runoff at the source before it can pick up nonpoint source pollutants.

The permeable pavement would replace 8,000 square feet of parking lot, capturing approximately 165,000 gallons of stormwater and reducing TN, TP, and TSS loads by nearly 60% (Virginia DCR Spec No. 7, 2011).</td></tr>
<tr><td colspan="2">Possible Funding Sources:
319(h) grants from the New Jersey Department of Environmental Protection
New Jersey Department of Transportation
Bergen County Soil Conservation District
Borough of Westwood
United Water New Jersey</td></tr>
</table>

Partners/Stakeholders:
Borough of Westwood
Bergen SWAN or other watershed groups

Estimated Cost:

Task	Task Description			Estimated Cost
1	Soil tests, Site delineation, permitting fees			$1,000
2	Prepare final design			$2,000
3	Activities for BMP installation	Unit Cost	Quantity	
	Green roof installation and maintenance[1]	$20/sq ft	4,000 sq ft	$80,000
	Rain garden installation	$2/sq ft	400 sq ft	$800
	Permeable pavement[2]	$10/sq ft	8,000 sq ft	$80,000
	Contingency (20%)			$32,160
	Implementation of school curriculum			$1,000
	Total BMP Installation Cost			**$193,960**
	Total Estimated Project Cost			**$196,960**

[1]Green Roofs for Stormwater Runoff Control, EPA, 2009
[2]Virginia DCR Stormwater Design Specification No. 7, 2011

MUSQUAPSINK BROOK WATERSHED RESTORATION & PROTECTION PLAN

Third Avenue Concept Design

Project ID: MB5_We_h
Municipality: Borough of Westwood
Subwatershed: MB5
Location: Segment of stream along 3rd Avenue

PROJECT LOCATION

RIPARIAN/FORESTED BUFFER (1)
A riparian or forested buffer is an area along a shoreline, wetland, or stream where development is restricted or prohibited. The primary function of aquatic buffers is to physically protect and separate a stream, lake, or wetland from future disturbance or encroachment. If properly designed, a buffer can provide stormwater management, and can act as a right-of-way during floods, sustaining the integrity of stream ecosystems and habitats. As conservation areas, aquatic buffers are part aquatic ecosystem and part urban forest.

www.epa.gov

STREAMBANK STABILIZATION (2)
Streambank stabilization consists of using vegetation or structural materials to stabilize and protect banks of streams, brooks, rivers, or excavated channels against scour and erosion from flowing water. Streambank vegetation that is sufficiently developed contributes large woody material to streams, creates critical structural elements of habitats for many different species. Still streambanks stabilized with shrub and tree vegetation provides excellent habitat for fish and wildlife species.

www.maine.gov

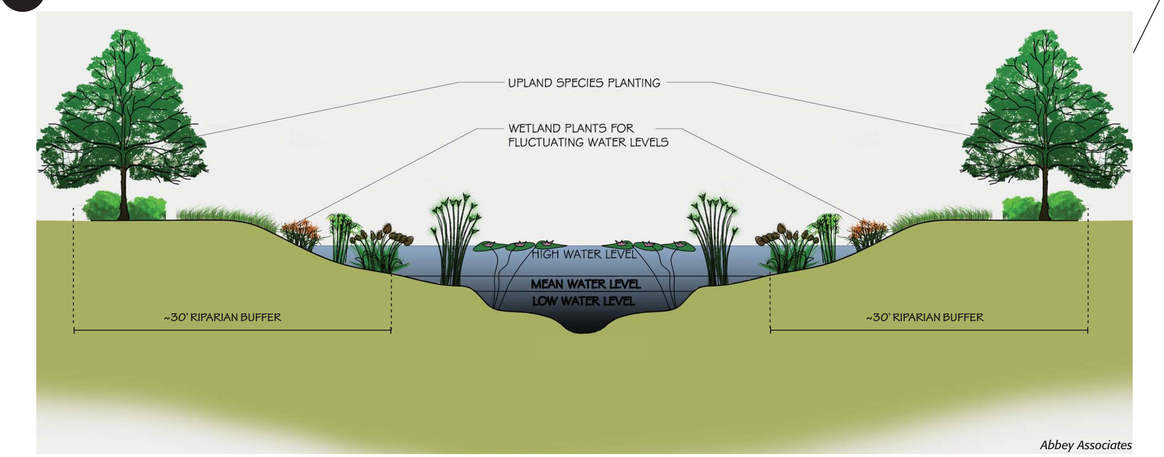
SITE PHOTOS

RUTGERS New Jersey Agricultural Experiment Station

Water Resources Program

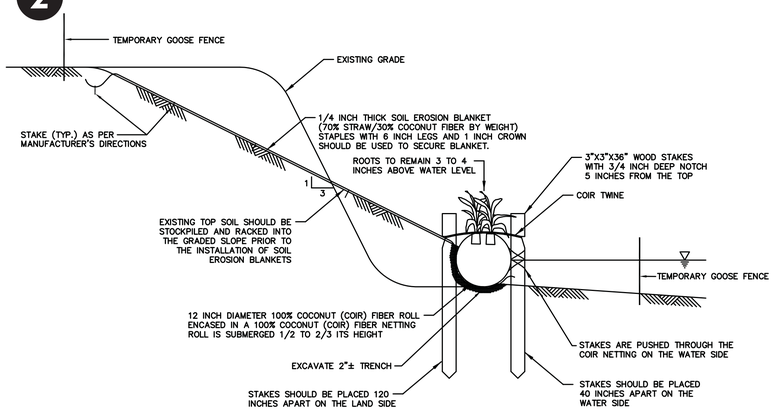
SITE PLAN

1 RIPARIAN BUFFER RESTORATION



Abbey Associates

2 STREAMBANK STABILIZATION



SHORELINE WITH COCONUT FIBER ROLL AND ECO-NET STABILIZATION

MUSQUAPSINK BROOK WATERSHED RESTORATION & PROTECTION PLAN

Berkeley Elementary School Concept Design

Project ID: MB6_We_g
Municipality: Borough of Westwood
Subwatershed: MB6
Location: Berkeley Elementary School

PROJECT LOCATION

RAIN GARDEN (1)
A rain garden is a landscaped, shallow depression that captures, filters, and infiltrates stormwater runoff. The rain garden removes nonpoint source pollutants from stormwater runoff while recharging groundwater.

GREEN ROOF (2)
A green roof, or rooftop garden, is a vegetative layer grown on a rooftop. Green roofs provide shade and remove heat from the air through evapotranspiration, reducing temperatures of the roof surface and the surrounding air. On hot summer days, the surface temperature of a green roof can be cooler than the air temperature, whereas the surface of a conventional rooftop can be up to 90°F (50°C) warmer.

STORMWATER MANAGEMENT IN YOUR SCHOOL YARD (3)
The Stormwater Management in Your School Yard educational program is designed to provide fourth and/or fifth grade students with an opportunity to apply their science, math, and communication skills to real-world environmental problems through the building of a rain garden on the school's campus. The main focus of the Stormwater Management in Your School Yard program curriculum is rain gardens. However, topics such as water, soil, and plant ecology are presented, and connections between these topics and rain gardens are introduced and discussed with the students.

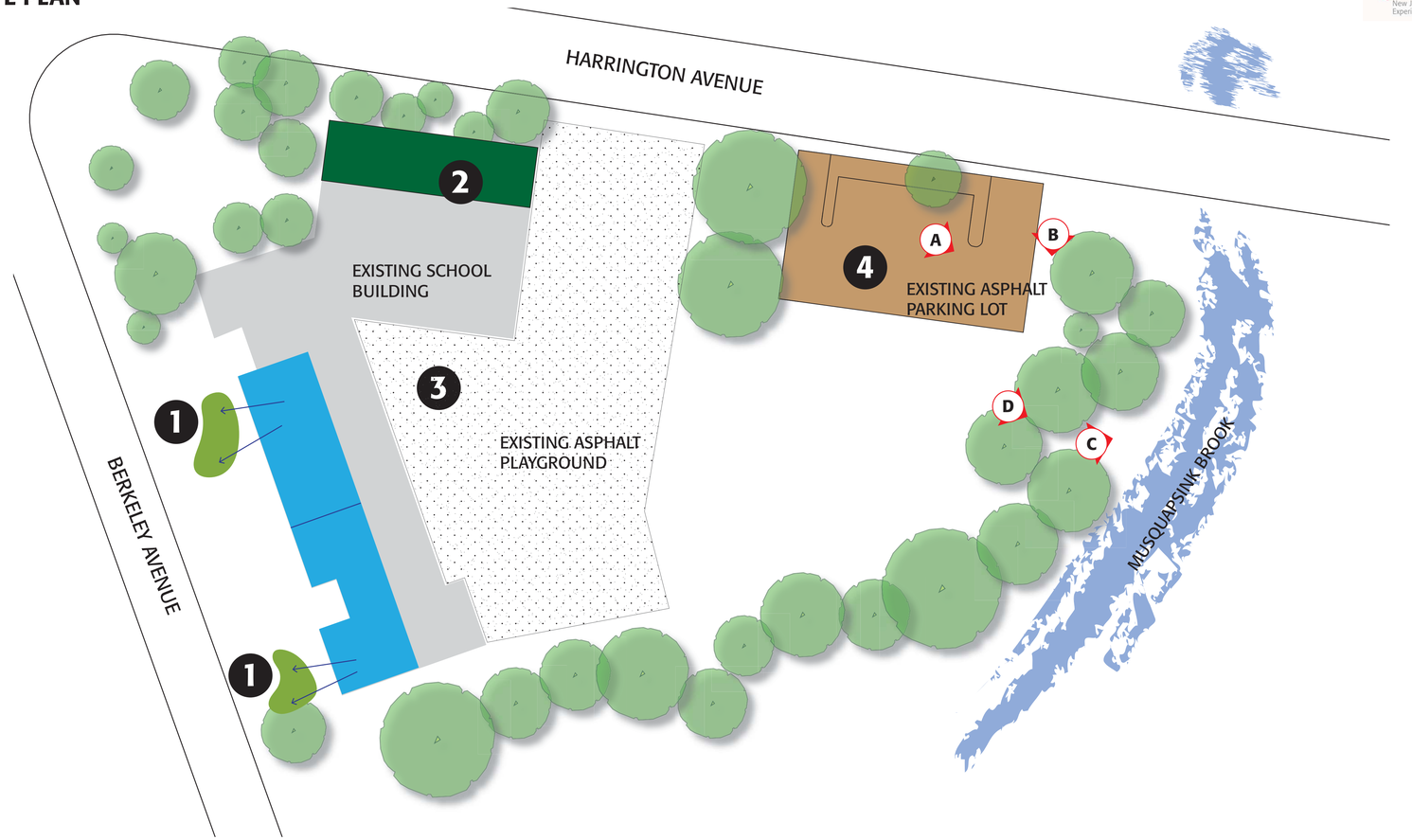
PERVIOUS PAVEMENT (4)
Permeable pavement is an alternative to asphalt or concrete surfaces that allows stormwater to drain through the porous surface to a stone reservoir underneath. The reservoir temporarily stores surface runoff before infiltrating it into the subsoil. The appearance of the alternative surface is often similar to asphalt or concrete, but it is manufactured without fine materials and instead incorporates void spaces that allow for storage and infiltration. (*www.epa.gov)*

SITE PHOTOS

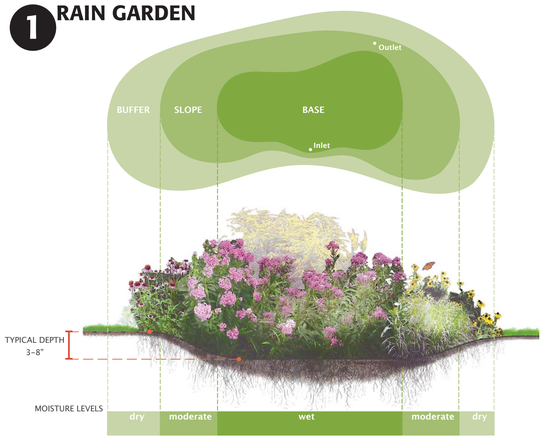
RUTGERS New Jersey Agricultural Experiment Station

Water Resources Program

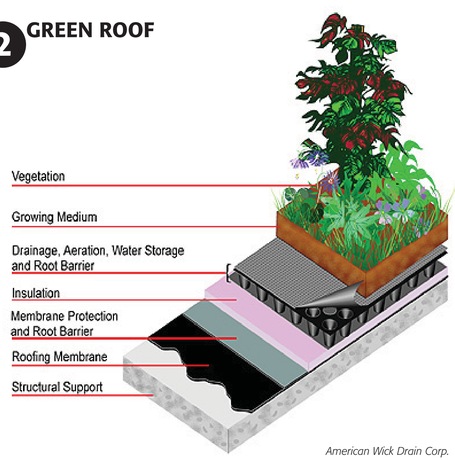
SITE PLAN



1 RAIN GARDEN



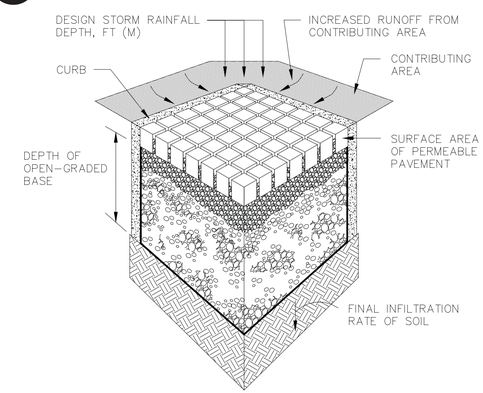
2 GREEN ROOF



American Wick Drain Corp.

3 STORMWATER MANAGEMENT IN YOUR SCHOOL YARD

4 PERVIOUS PAVEMENT



MUSQUAPSINK BROOK WATERSHED RESTORATION & PROTECTION PLAN

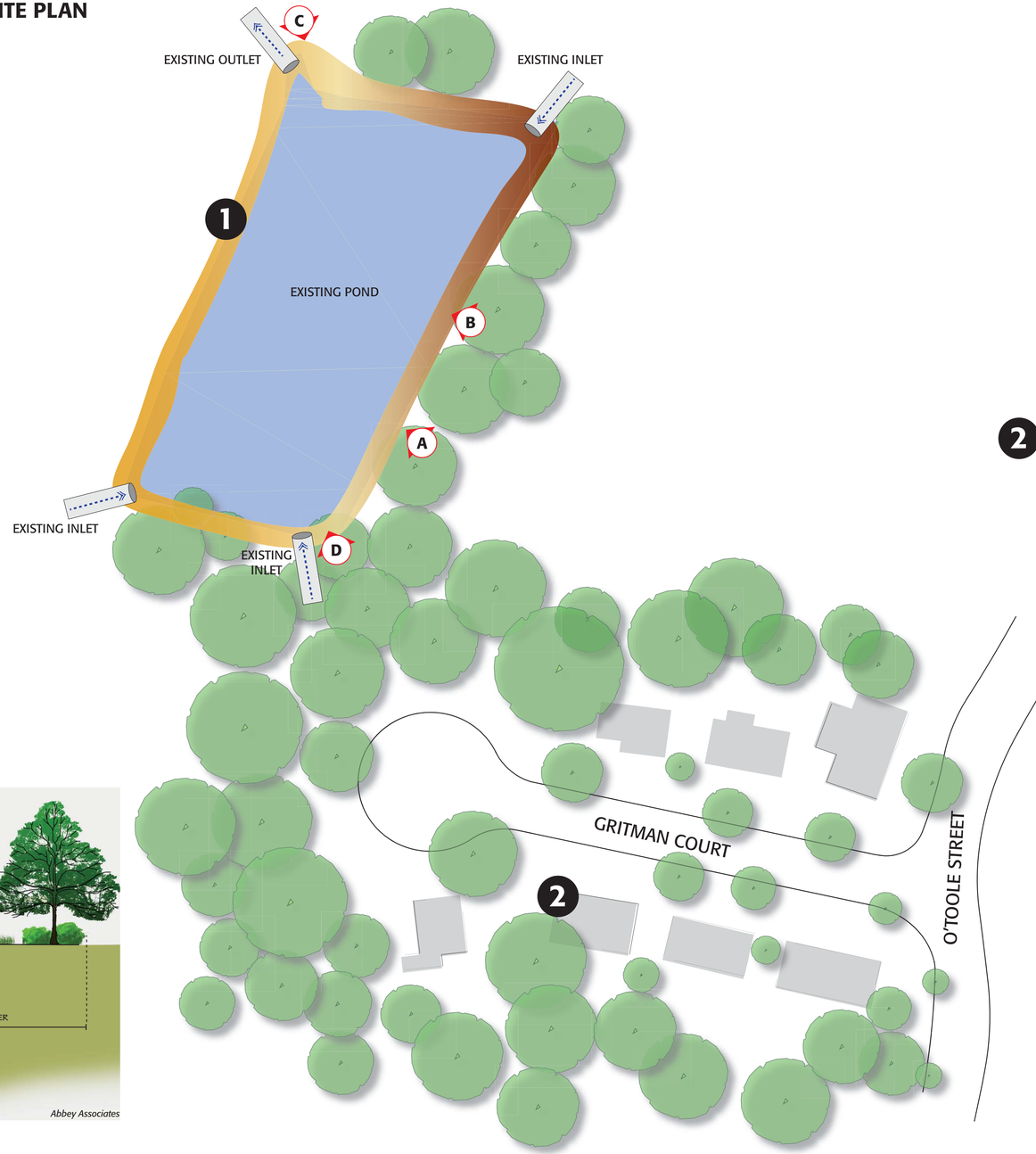
Gritman Park Concept Design

Project ID: MB5_We_e
Municipality: Borough of Westwood
Subwatershed: MB5
Location: Gritman Park and surrounding neighborhood

PROJECT LOCATION

SITE PHOTOS

SITE PLAN



RIPARIAN/FORESTED BUFFER (1)
A riparian or forested buffer is an area along a shoreline, wetland, or stream where development is restricted or prohibited. The primary function of aquatic buffers is to physically protect and separate a stream, lake, or wetland from future disturbance or encroachment. If properly designed, a buffer can provide stormwater management, and can act as a right-of-way during floods, sustaining the integrity of stream ecosystems and habitats. As conservation areas, aquatic buffers are part aquatic ecosystem and part urban forest.

www.epa.gov

STREAMSIDE LIVING (2)
Streams, rivers and lakes are part of a dynamic system that changes over time. While many changes are natural, people have the greatest impact on the system.

- Polluting the water with pesticides, fertilizers and chemicals.
- Diverting water from the stream.
- Altering the banks or bed of a stream or the natural flow of water.

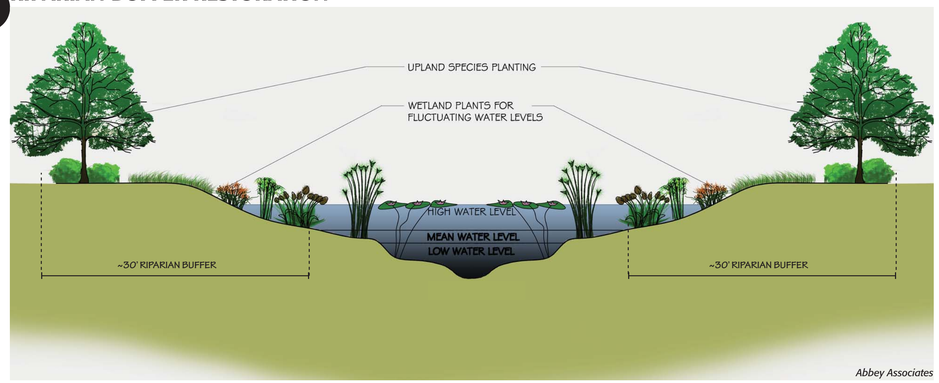
Each of these activities affects the health of the water and the streamside habitat. One change might not seem like a lot, but the everyday activities of landowners all add up to an enormous impact.

Healthy streamsides have stable soils that support a variety of plant life, from grasses to shrubs and trees. Streamside riparian areas provide:

- Protection of property from flood damage and erosion by holding soil in place with plant roots.
- Clean water by preventing fertilizers, pesticides, animal wastes, sediment, and pollutants from entering streams.
- Habitat for fish and wildlife as plants provide shelter and food for wildlife and shade the water to create cooler temperatures needed by fish.
- Enhanced water supplies and stream flows by storing the rain water that soaks into the soil. The riparian area then slowly releases the water during the dry season.

www.sccd.org

1 RIPARIAN BUFFER RESTORATION



Abbey Associates

2 STREAMSIDE LIVING - RAIN BARRELS + EDUCATION

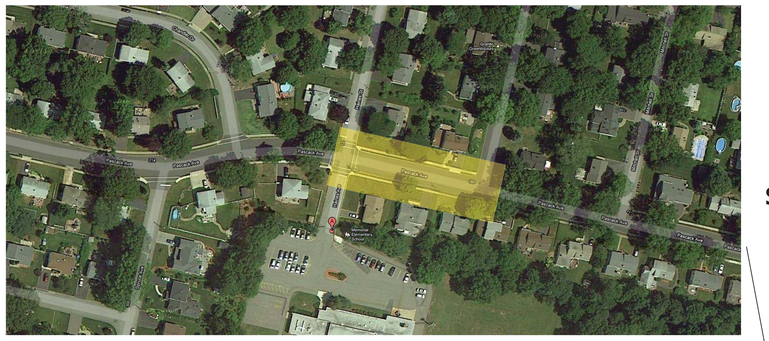
MUSQUAPSINK BROOK WATERSHED RESTORATION & PROTECTION PLAN

Green Street Concept Design

RUTGERS New Jersey Agricultural Experiment Station

Water Resources Program

PROJECT LOCATION



SITE PHOTOS

Project ID: MB6_E_a
Municipality: Borough of Emerson
Subwatershed: MB6
Location: Roadways in residential neighborhood; intersection of Pascack Avenue and Haines Street

What is a Green Street?
Green streets are an innovative design concept that can transform our streets into appealing landscaoed areas while managing stormwater runoff. Designed to be attractive as well as functional, green streets use vegetation and soil to capture, slow, filter, and infiltrate stormwater runoff. They manage stormwater, provide environmental benefits, beautify our streetscapes, add greenery to urban areas, enhance pedestrian and bicycle safety, and provide habitat.

RAIN GARDEN (1)
A rain garden is a landscaped, shallow depression that captures, filters, and infiltrates stormwater runoff. The rain garden removes nonpoint source pollutants from stormwater runoff while recharging groundwater.

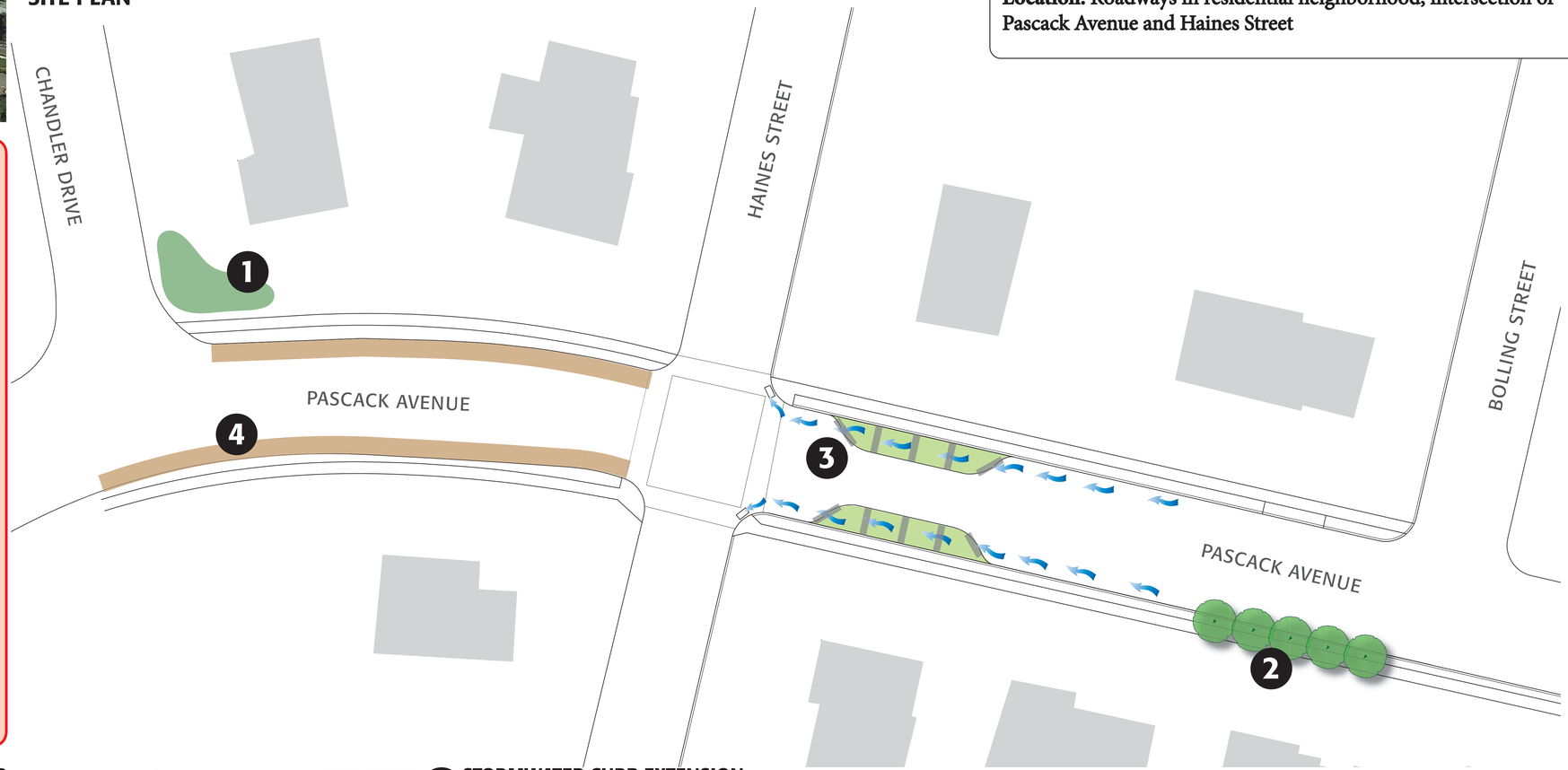
TREE BOX FILTER (2)
Tree box filters are in-ground containers used to control runoff water quality and provide some detention capacity. Often premanufactured, tree box filters contain street trees, vegetation, and soil that help filter runoff before it enters a catch basin or is released from the site. Tree box filters can help meet a variety of stormwater management goals, satisfy regulatory requirements for new development, protect and restore streams, control combined sewer overflows (CSOs), retrofit existing urban areas, and protect reservoir watersheds.

STORMWATER CURB EXTENSION (3)
A curb extension or bump out is typically a paved area that extends into the street and is used to help calm traffic and increase pedestrian safety. By altering this design with curb openings that allow runoff to enter and adding a special soil mix and appropriate vegetation, a curb extension can function as an attractive stormwater facility while still providing traffic calming benefits.

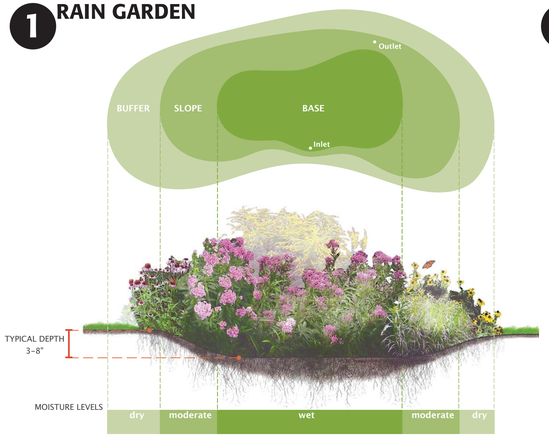
PERVIOUS PAVEMENT (4)
Permeable pavement is an alternative to asphalt or concrete surfaces that allows stormwater to drain through the porous surface to a stone reservoir underneath. The reservoir temporarily stores surface runoff before infiltrating it into the subsoil. The appearance of the alternative surface is often similar to asphalt or concrete, but it is manufactured without fine materials and instead incorporates void spaces that allow for storage and infiltration.

www.epa.gov

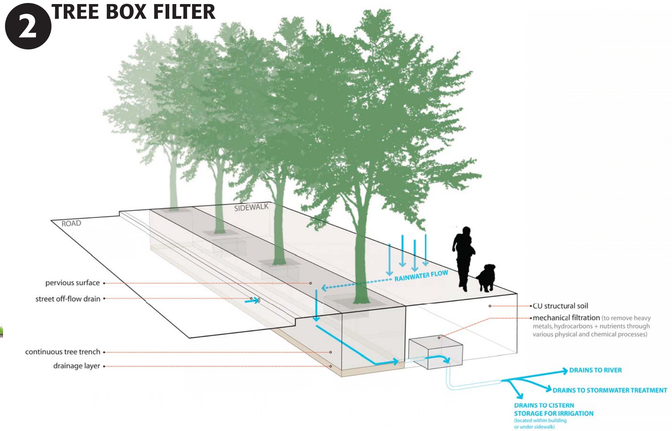
SITE PLAN



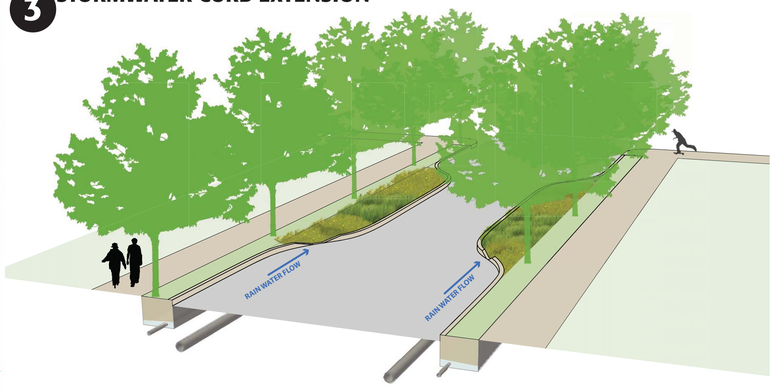
1 RAIN GARDEN



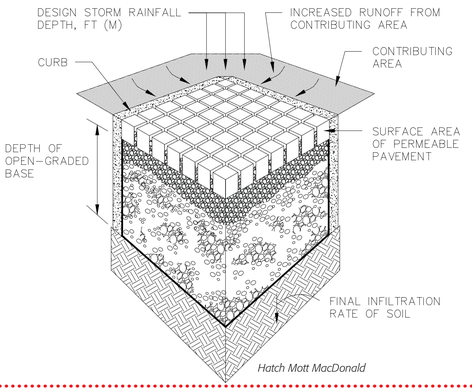
2 TREE BOX FILTER



3 STORMWATER CURB EXTENSION



4 PERVIOUS PAVEMENT



Hatch Mott MacDonald

MUSQUAPSINK BROOK WATERSHED RESTORATION & PROTECTION PLAN

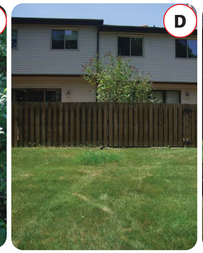
Washington Green Townhomes Concept Design

Project ID: MB4_Wa_f
Municipality: Washington Township
Subwatershed: MB4
Location: Washington Green Townhomes, Hampton Court

PROJECT LOCATION

WHAT IS A RAIN GARDEN?
A rain garden is a landscaped, shallow depression that captures, filters, and infiltrates stormwater runoff. The rain garden removes nonpoint source pollutants from stormwater runoff while recharging groundwater. A rain garden has two main goals. The first goal is to serve as a functional system to capture, filter, and infiltrate stormwater runoff at the source, and the second goal is to be an aesthetically pleasing garden. Rain gardens are an important tool for communities and neighborhoods to create diverse, attractive landscapes while protecting the health of the natural environment.

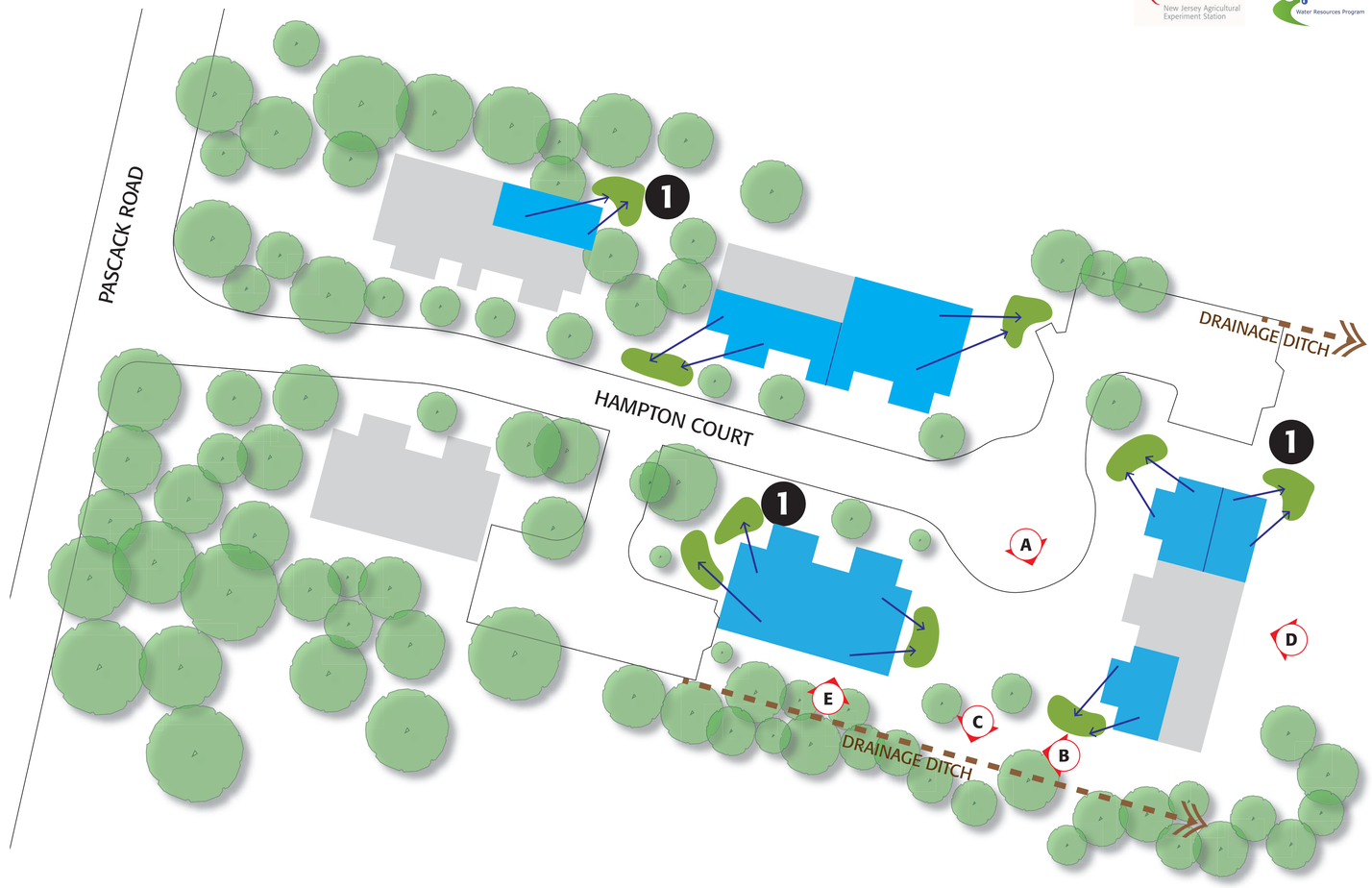
SITE PHOTOS



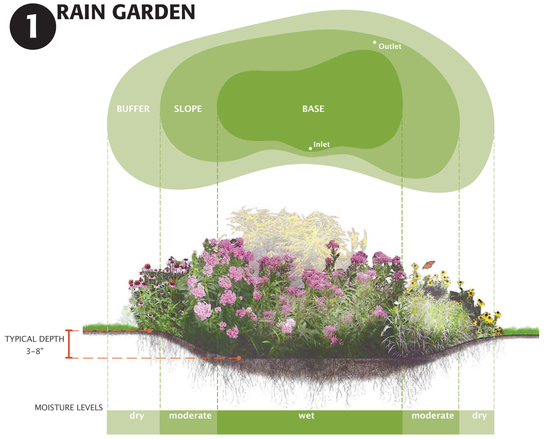
RUTGERS New Jersey Agricultural Experiment Station

Water Resources Program

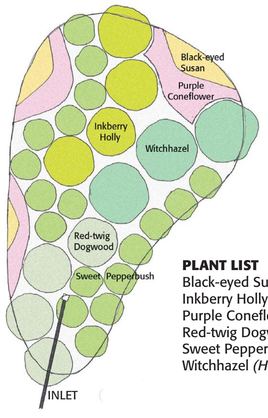
SITE PLAN



1 RAIN GARDEN

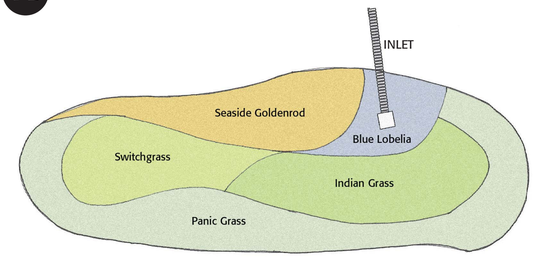


1a PLANTING PLAN - SHRUB RAIN GARDEN



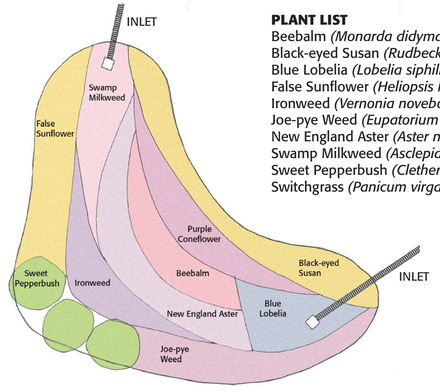
PLANT LIST
Black-eyed Susan *(Rudbeckia laciniata)*
Inkberry Holly *(Ilex glabra)*
Purple Coneflower *(Echinacea purpurea)*
Red-twig Dogwood *(Cornus sericea)*
Sweet Pepperbush *(Clethera alnifolia)*
Witchhazel *(Hamamelis virginiana)*

1b PLANTING PLAN - GRASSES RAIN GARDEN



PLANT LIST
Blue Lobelia *(Lobelia siphilitica)*
Indiangrass *(Sorghastrum nutans)*
Panic Grass *(Panicum virgatum)*
Seaside Goldenrod *(Solidago sempvirens)*
Switchgrass *(Panicum virgatum)*

1c PLANTING PLAN - WILDFLOWER RAIN GARDEN



PLANT LIST
Beebalm *(Monarda didyma)*
Black-eyed Susan *(Rudbeckia laciniata)*
Blue Lobelia *(Lobelia siphilitica)*
False Sunflower *(Heliopsis helianthoides)*
Ironweed *(Vernonia noveboracensis)*
Joe-pye Weed *(Eupatorium spp.)*
New England Aster *(Aster novae-angliae)*
Swamp Milkweed *(Asclepias incarnata)*
Sweet Pepperbush *(Clethera alnifolia)*
Switchgrass *(Panicum virgatum)*