

THE BERM AND OUTLET



The berm is the low earthen wall of the swale that is planted with upland plants. The berm defines the edge of the swale and helps maintain the flow of the runoff within the channel of the swale.

Photo credit, Pat Rector



The rip-rap apron at the outlet provides for final settling and velocity reduction prior to entering the Troy Brook.

From top to bottom: Putting up silt fence; Hand-placing rip rap stones; Blue flag irises growing among the stones.

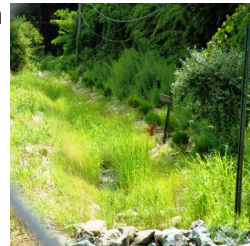
Photo credit Pat Rector

CHANNEL



Grass plugs are ready for installation in the swale.

As mentioned previously grasses and sedges are planted in the channel to help reduce the velocity of flow to promote settling. Grasses will bend with the onslaught of water but still provide resistance to the flow, and by planting several types can be vibrant from early spring until late fall. Grasses are also a less costly means to fill in an extensive channel.



Vegetated swale several months after planting.

Photo credit Pat Rector

COSTS AND MAINTENANCE

- Excavation was done by the DPW staff, while planting was done by Rutgers faculty, staff, students, and Rutgers Master Gardener volunteers
- Plant and associated costs were \$2,250, while the Rutgers Water Resources Program design costs were \$4,750.
- During the first year, plants need to be watered regularly. Native grasses will still need to be watered in the first year.
- The plants on the berm should be weeded, watered, and mulched to assure good growth the first year. Watch the berm for signs of erosion.
- Always check the rip rap outlet for signs of standing water, a breeding ground for mosquitoes.

For more information please contact:

Cooperating Agencies: Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and County Boards of Chosen Freeholders. Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station, is an equal opportunity program provider and employer.

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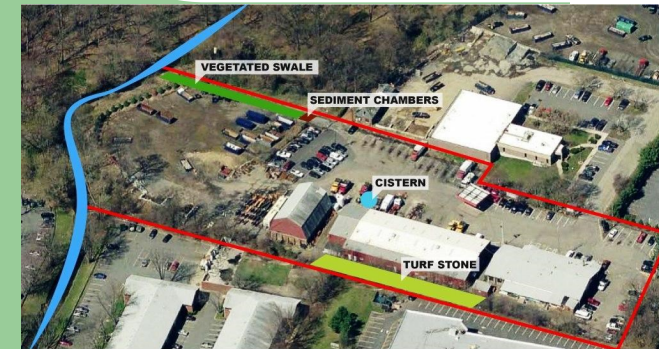
RUTGERS

New Jersey Agricultural
 Experiment Station



VEGETATED SWALE

Greening the Department of Public Works (DPW) Facility in the Troy Brook Watershed



The Parsippany Department of Public Works (DPW) facility is approximately three acres. Most of the area consists of impervious surfaces. During the 1.25 inch two hour water quality storm, an estimated 71,275 gallons (9,801 ft³) of stormwater runoff are generated at the facility.

Implementation Project completed by
 Rutgers Cooperative Extension Water Resources Program
 and Rutgers Cooperative Extension of Morris County under
 a 319(h) Grant from the
 NJ Department of Environmental Protection

THE SITUATION



A 66,300 square foot parking lot drains to one area bringing dirt from truck washing and other normal operating dirt along with some residual hydrocarbons from fueling station.

The Troy Brook is adjacent to the Parsippany-Troy Hills Department of Public Works (DPW) facility. The Troy Brook has an impairment for biological life and the Troy Brook Regional Stormwater Management Plan has identified the DPW facility as an area that contributes to localized flooding issues in the stream. Stormwater runoff from the building roofs, parking areas and fueling station all drain directly to the Troy Brook. It is estimated that 72% of the runoff from the total site drains to this area.



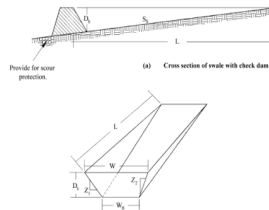
Fueling Station Parsippany-Troy Hills DPW facility; second figure is of oil visible along the edge of sediment in the swale
Photo credit Pat Rector

THE SOLUTION



Vegetated swale (1,200 linear feet) with the first cell filled with sediment.
Photo credit Pat Rector

The Rutgers Cooperative Extension (RCE) Water Resources Program and RCE of Morris County utilizing funding from a Section 319(h) of the Clean Water Act grant from the New Jersey Dept. of Environmental Protection installed a vegetated swale.



US EPA Storm Water Technology Fact Sheet Vegetated Swale 832-99-006 September 1999

A vegetated swale is a trapezoidal channel. The swale is 1,200 linear feet and treats 1.76 million gallons of runoff annually and 78,835 gallons during the water quality storm (1.25 inches/2hr.). The peak flow rate into the swale is estimated at 7.3 ft³/sec.

POLLUTANT REMOVAL

Several of the plants that are used in this vegetated swale were specifically chosen based on their ability to remove hydrocarbons, switchgrass, ryegrass, and big bluestem.



Rutgers student spreading rye grass seed in the channel of the vegetated swale.
Photo credit Pat Rector

TABLE 1 EFFECTIVENESS OF DESIGN SWALES

Pollutant	Median % Removal
Total Suspended Solids	81
Oxygen Demanding Substances	67
Nitrate	38
Total Phosphorus	9
Hydrocarbons	62
Cadmium	42
Copper	51
Lead	67
Zinc	71

Typical pollutant removal efficiencies based on US EPA Fact Sheet on vegetated swales.

SWALE PREPARATION



Several check dams were installed in the vegetated swale using rocks in wire cages (also known as gabions). These check dams create a barrier to reduce channel velocity and promote settling of sediments.



Jute matting was installed. The jute matting is laid down in the swale and stapled into ground. The matting holds the soil in place and prevents erosion, creating more favorable growing conditions for young plants.